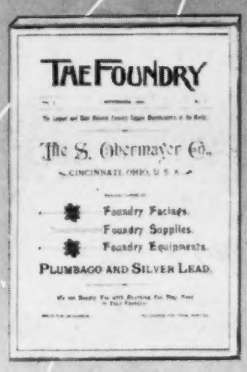
FOUNDRY

SEPTEMBER 1952.

MARKS 60 YEARS OF SERVICE TO A BASIC INDUSTRY



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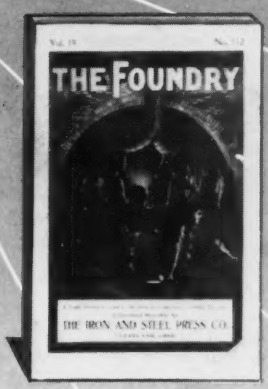

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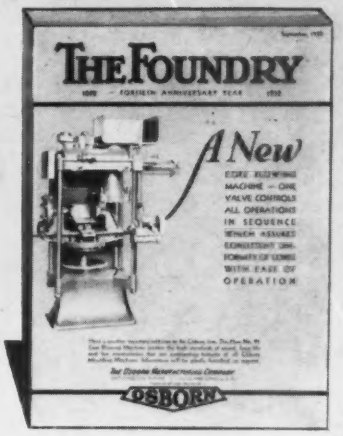

1932

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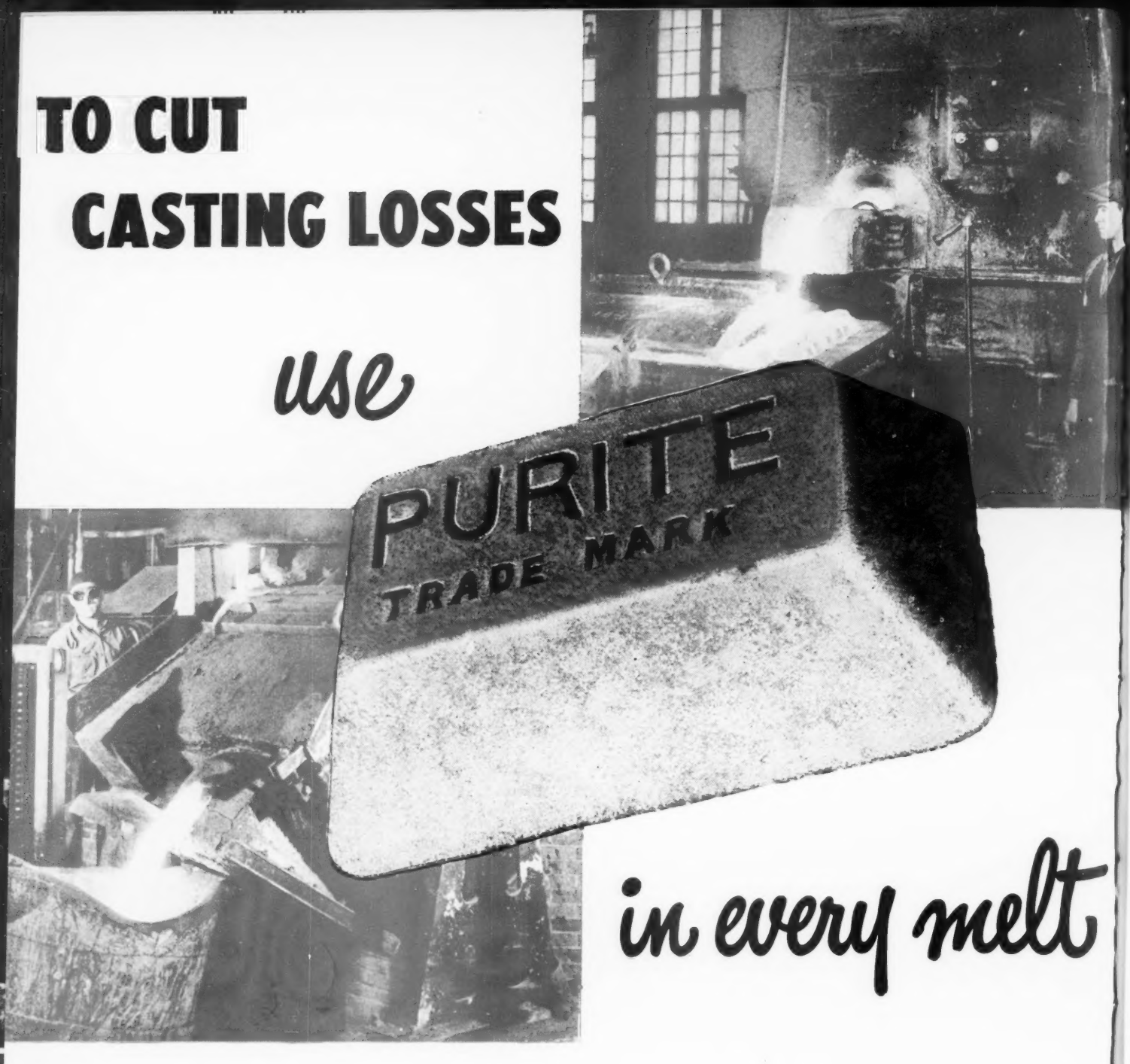
TO CUT CASTING LOSSES

use



in every melt

Every day, more leading foundries are using Purite *regularly* to cut casting losses and increase production of finished work. In these foundries, the use of Purite is standard operational procedure in every cupola charge. In the ladle too, Purite helps keep production high.

For over 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. **Purite produces a higher percentage of finished castings per ton of metal poured.**
2. **Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.**
3. **Purite gets to all the iron quicker.**
4. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
5. **Purite comes in 2-lb. pigs—no weighing or measuring required.**
6. **Purite is 100% pure fused soda ash—you do not pay for inert materials.**
7. **Purite does not crumble—no waste—no dust.**
8. **Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.**

Purite, the scientific flux for better melting and cleaner iron, is sold by all leading foundry supply houses in the United States and Canada. Mathieson Chemical Corporation, Baltimore 3, Maryland.

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

FOR FASTER, EASIER, LOWER COST FINISHING OF GRAY IRON CASTINGS

'NISILOY'*

(NICKEL-SILICON-ALLOY)

• WHAT IT IS

"NISILOY" is an inoculant with positive graphitizing power. It contains about 60% nickel, 30% silicon, balance essentially iron. Its remarkably low melting point of 1800° F. and relatively high specific gravity causes it to dissolve quickly in liquid iron.

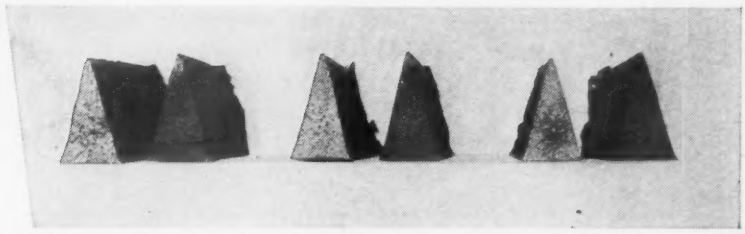
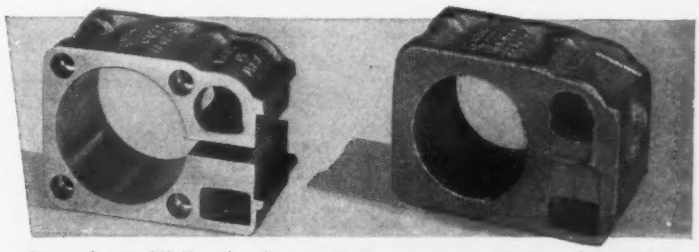


Photo of 1" chill test bars show advantages of Nisiloy. In each pair, wedge on left is white, and was cast without Nisiloy. Right hand wedges used progressively 1 to 1½% Nisiloy. Notice complete elimination of hard white iron on specimen at extreme right.

• WHAT IT DOES

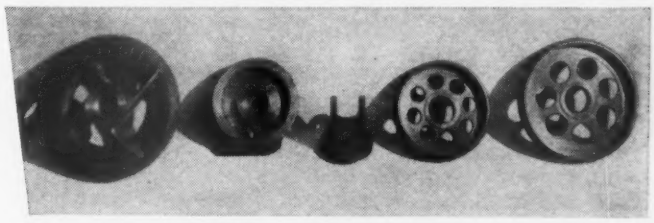
"NISILOY" improves machinability . . . it provides a dense, gray, easy-to-machine structure that reduces machine shop costs.



Use of 1% Nisiloy in these cylinder castings eliminated machining troubles from hard spots in light sections, raised output, reduced rejects and cut final costs.

• HOW TO USE IT

"NISILOY" is simply added to the ladle. Additions of from .25 per cent to 1.00 per cent usually prove sufficient for structure control. Improve quality and quantity of your output. Get full information . . . mail the coupon now.



Nisiloy helps you control properties of gray iron for casting parts with varied cross sections that tend to create chilled surface areas. Its use eliminated machining troubles, and provided a dense, uniform close-grained microstructure in these bonnets, slide valves and bushing.

*Trade Mark of The International Nickel Company, Inc.

EMBLEM OF INCO SERVICE
TRADE MARK

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to the appropriate authorities, nickel is obtainable for the production of engineering alloys for many end uses in defense and defense-supporting industries.

THE INTERNATIONAL NICKEL COMPANY, INC.
Dept. 20, 67 Wall Street, New York 5, N. Y.

Please send me your booklet entitled, "NISILOY" for GRAY IRON CASTINGS.

Name..... *Title*.....

Company.....

Address.....

City..... *State*.....

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

MANY TIMES

THE NATURAL BONDING POWER OF ANY OTHER TYPE OF SAND BOND

Used primarily as an admix to molding and core sands, GREEN BOND is unexcelled in its ability to develop and control green bond strength. Tests show that it has from six to ten times the bond strength of the clays found in most natural molding sands. It produces high green and dry strength in sharp sands even when comprising but ½% to ¾% of the entire mixture, yet molds disintegrate readily at the shakeout. GREEN BOND coats the individual grains of sand as completely as core oils coat core sands, therefore does not clog the voids. Bond is thus established at the points of contact of the grains and the sand is left properly porous and permeable.

There are many other advantages connected with the use of GREEN BOND which, of course, you'll never obtain unless you try it.

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

FEDERAL

CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA • DETROIT • MILWAUKEE • NEW YORK • RICHMOND • ST. LOUIS • LOS ANGELES • UPTON, WYO.

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CANADA—Overseas Commodities Ltd., 2845 Grandview Hgy., Vancouver, B.C. • T. D. Barnes, 59 Sun Life Bldg., Hamilton, Ont. • Newman Foundry Supply, Ltd., 643 St. Paul St. W., Montreal, Que. European Concessionaires: The District Chemical Company, Ltd., 1-19 New Oxford St., London W. C. 1, England.

SEPTEMBER 1952

FOUNDRY

Volume 80—Number 9

NBP CCA

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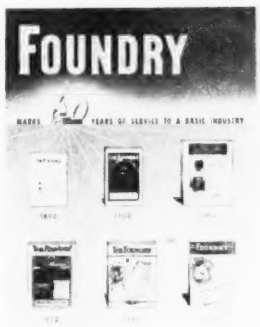
Business Staff—Page 312



THE COVER: Nine hundred issues are represented by those marking the six decades of service

SPECIAL ARTICLES

Editorial 85

Statuary to Electronics via Plaster Molding 86
By FRANK PFISTER

Sand Reclamation at the Eddystone Plant 92
By KARL S. HOWARD and CLYDE B. JENNI

Core Serves as Gate and Riser 96
By BEN F. SWEET

Develops New Process for Casting Stock Bushings 98
By J. GILBERT HILL

Malleable Iron Foundry Is Model of Good Housekeeping 100
By FRANK G. STEINEBACH

Accuracy Is Byword in Fine-Hardware Foundry 106

Casting Stainless Steel in Shell Molds 108

Band-Sawing Nonferrous Castings 112
By H. J. CHAMBERLAND

Man-to-Man on the Molder's Bench 144
By RALPH L. LEE

Institute of British Foundrymen Annual Conference 148
By VINCENT DELPORT

Plaster and Plastics Combine in New Pattern Material 174
By THOMAS A. DICKINSON

Increasing Scrap Charging in the Cupola 182
By LEWIS H. GROSS

Investment Casting 193
By ROY W. TINDULA

Purdue University Converts to Modernized Foundry 266
By JAMES W. MAYER

NEWS FEATURES

Around the Country 138
Calendar of Meetings 146
Foundry Group Activities 158
Industry Briefs 230
Late Foundry News 33
Men of Industry 120
News Views 136
Obituary 214
Statistics 133

DEPARTMENTS

ABC of Foundry Practice 223
Adventures of Bill By PAT DWYER 238
Advertisers' Index 312
Data Sheet 171
Foundry Developments 142
Ideas for Foundrymen 251
New Equipment and Supplies 248
Questions and Answers 114
Readers' Comment 82
Trade Publications 285
With the Editors 10

Inspecting precision transmission housing for a U.S. Army Ordnance vehicle. 37 cores are used to produce this "Quality" giant which is cast in a dry sand mold.

SEND FOR FREE BOOKLET
ON 700 SERIES LINOIL

LINOIL...

★ ONE GOOD REASON WHY *Quality* ALUMINUM CASTING CO. LIVES UP TO ITS NAME

Setting cores in the mold for the casting of a large impeller. Because fins in the casting are extremely thin, the utmost care must be exercised in the core room.

Hard-to-make castings held to close tolerances are a specialty of Quality Aluminum Casting Co., Waukesha, Wisconsin.

Core work in many of the castings is highly intricate. This transmission housing, for example, takes 37 different cores; some large, some tiny, all important. A few cores are so located that adequate venting is a problem.

Quality Aluminum expects each casting to be sound and accurate, leaves nothing to chance to insure this. One step is to make up a set of plaster cores for checking the fit of individual pieces. Another is to specify LINOIL for the entire job . . . and every other job as well.

LINOIL is used at Quality for two reasons: first, they find it flexible enough to fit into any core job, from large mold sections to delicate interior cores. And second, they've used LINOIL for over thirty years—know from experience that it is a constant factor in their production.

Your LINOIL representative will be happy to demonstrate LINOIL in your foundry. Ask him the next time he calls.

★ **When there's a** *Question of Quality*, **switch to LINOIL!**

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO

Jobbing Foundries!

Want to Save

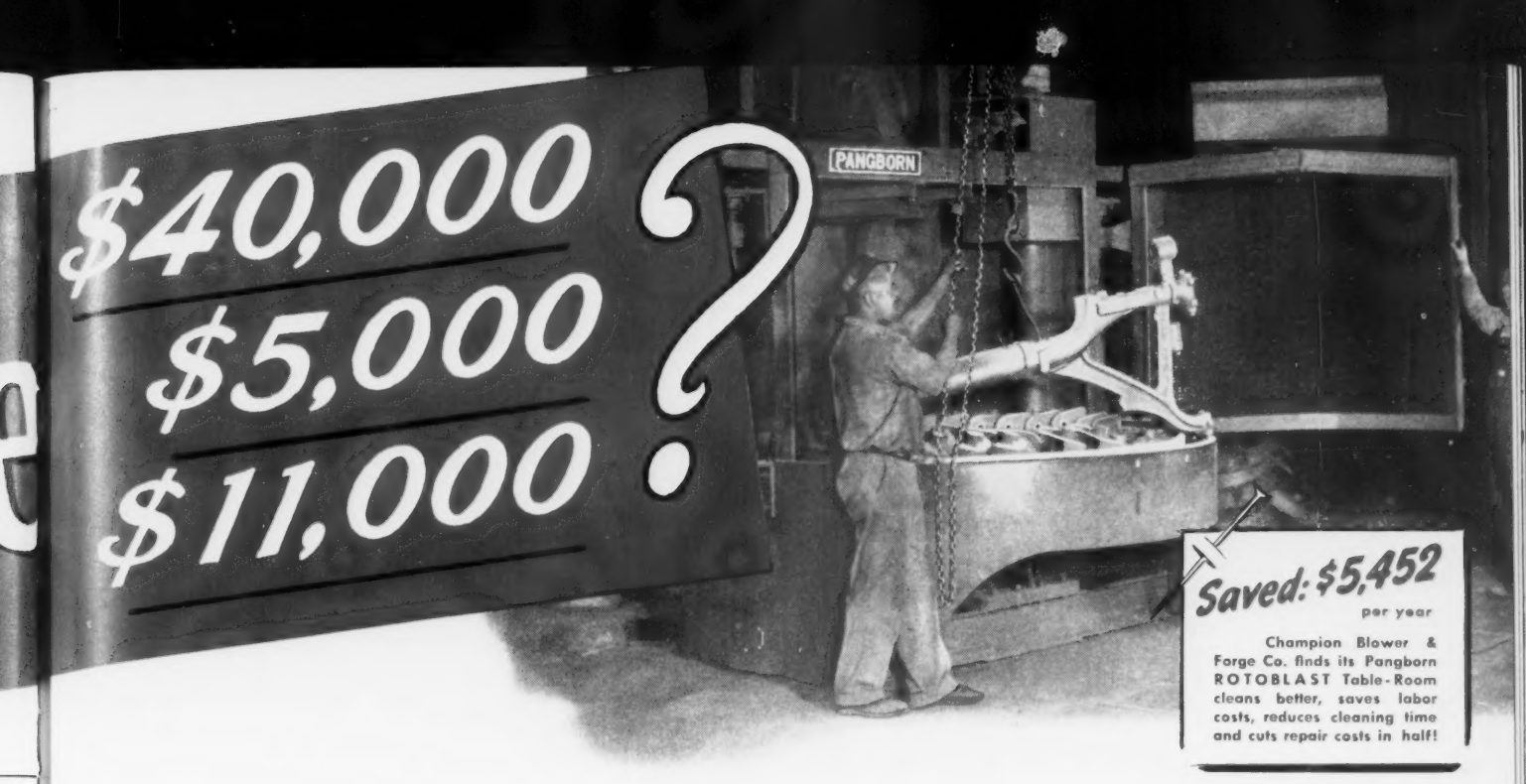
How ROTOBLAST works for you:

SAVES LABOR with push-button operation
SAVES SPACE because machines are compact
SAVES TIME by cleaning more loads per day
SAVES POWER since no compressor is needed
SAVES TOOLS because all scale is removed

Saved: $40,944 per year

ROTOBLAST Table-Room cleans the entire output of General Foundries in 40% less time than previous method and practically eliminates breakage of delicate castings.

$40,000 $5,000 $11,000 ?



Saved: $5,452 per year

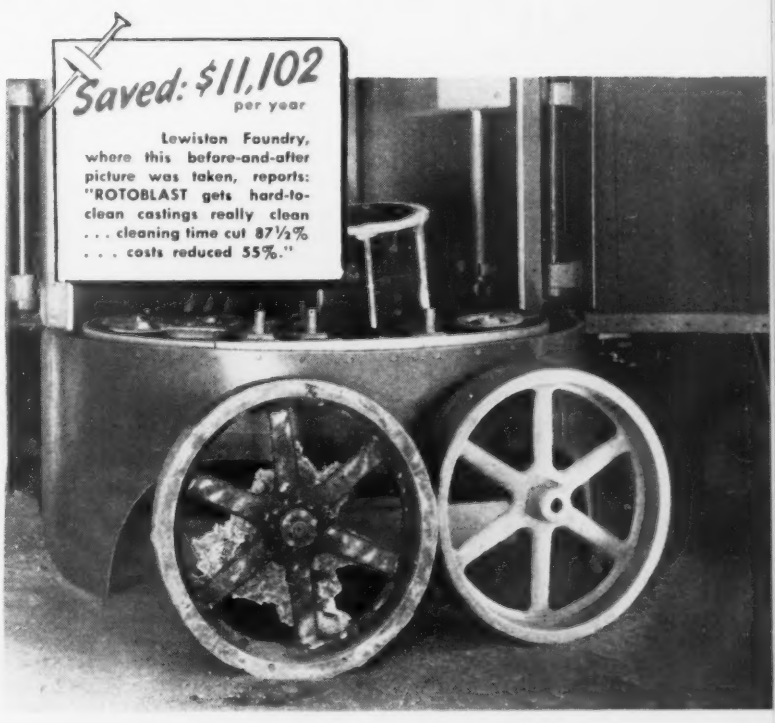
Champion Blower & Forge Co. finds its Pangborn ROTOBLAST Table-Room cleans better, saves labor costs, reduces cleaning time and cuts repair costs in half!

Install a Pangborn ROTOBLAST® Table-Room!

HERE are actual figures showing money saved in one year by jobbing foundries when a Pangborn ROTOBLAST LK Table-Room was put to work: Champion Blower & Forge Co., Lancaster, Pa., saved $5,452 on labor and maintenance. A $150 *per day* reduction in breakage plus labor savings netted General Foundries, Milwaukee, Wis., a total of $40,944! Lewiston Foundry, Lewiston, Pa., saved $11,102 on labor alone! In each case, just *one* LK Table-Room was responsible!

Hard to believe? We've got the facts! And we're ready to show you how Pangborn ROTOBLAST Table-Rooms set new records for low-cost, high-quality blast cleaning. From small castings of any shape, up to heavy castings of 5000 lbs., five feet long, thirty inches high; Pangborn Table-Rooms clean faster, better and cheaper!

And remember: there's a modern ROTOBLAST unit to do a better job at far lower cost, no matter what you clean —large or small castings, fragile or intricate castings, or any combination. Write for details. Ask for Bulletin No. 221 (Table-Rooms) or No. 214 (all ROTOBLAST equipment). Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.



Saved: $11,102 per year

Lewiston Foundry, where this before-and-after picture was taken, reports: "ROTOBLAST gets hard-to-clean castings really clean . . . cleaning time cut 87½% . . . costs reduced 55%."

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. FEMA

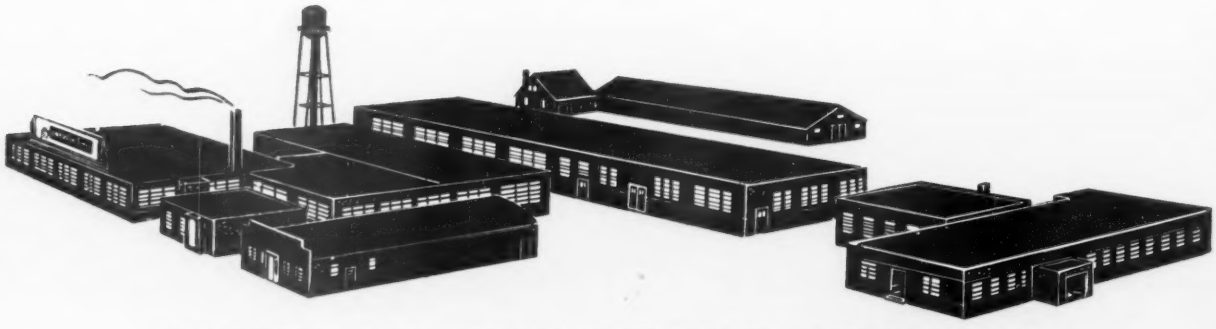
Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

UNIVERSAL flask pins and bushings are typical of the quality products that have helped to build Universal's Frankenmuth plant

Universal Flask Pins and Bushings are heat-treated and precision ground from finest quality steels. They will save you precious minutes of production time by assuring instant, accurate alignment of cope and drag. Universal Flask Pins and Bushings will give you long, satisfactory service and they will stand up under extremely rough treatment, thus saving you the additional cost and down-time that replacement always requires. Universal Flask Pins and Bushings are typical of the quality products being produced at the big, modern plant of the Universal Engineering Company in Frankenmuth, Michigan.

The modern home of finer production tools

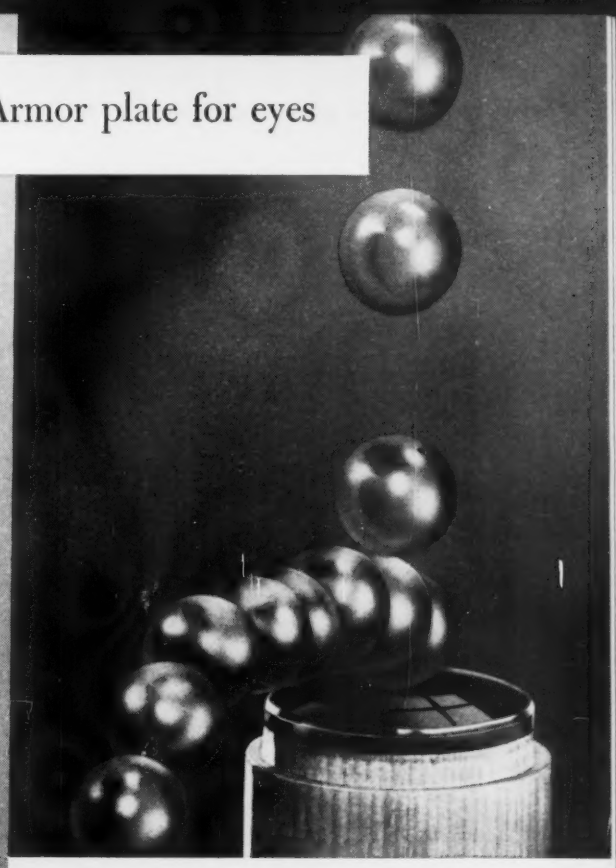


UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

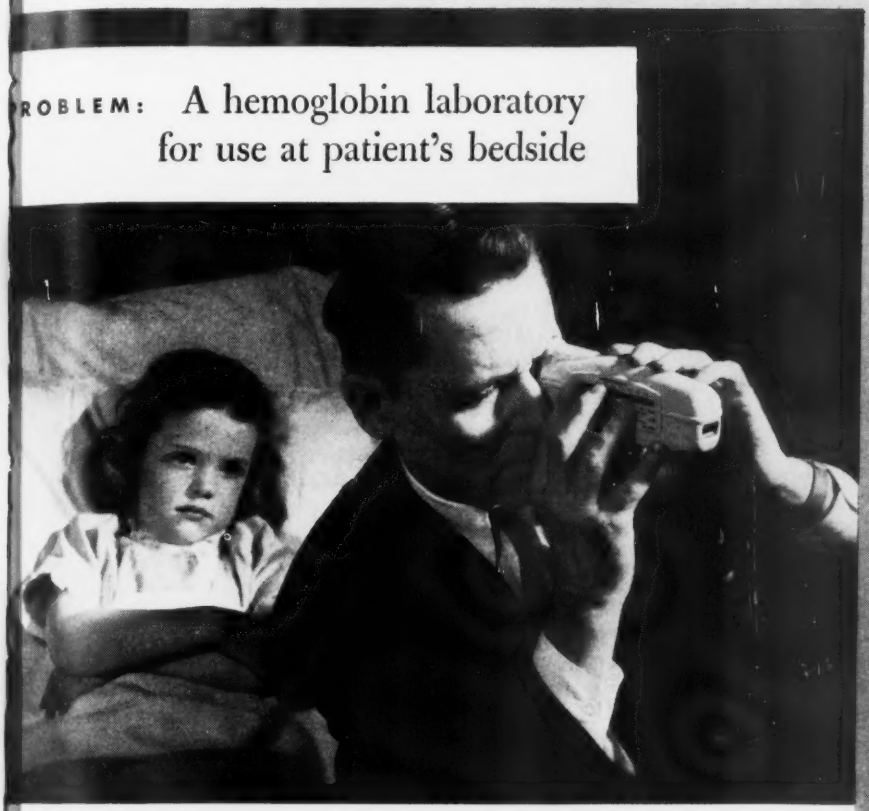
158

PROBLEM: Armor plate for eyes



ANSWER: If you dropped steel balls on *your* glasses, they'd shatter in dangerous splinters. AO safety-goggle lenses won't splinter. Scientists at American Optical devised a heat treatment that makes glass many times as strong, eyes safer.

PROBLEM: A hemoglobin laboratory for use at patient's bedside



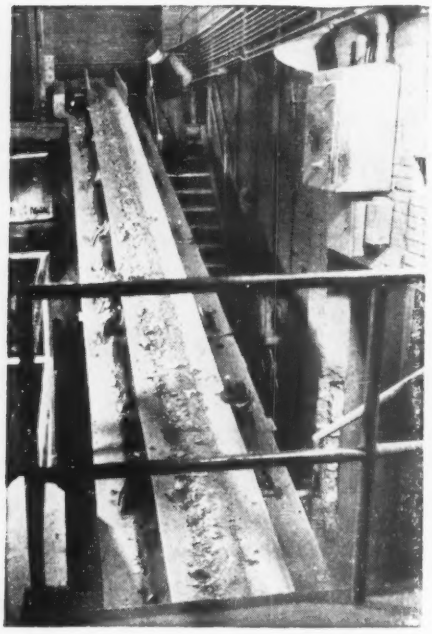
ANSWER: Today, a physician need not send blood samples to a laboratory for hemoglobin analysis and delay diagnosis. Within 3 minutes, he can read the answer in the Hb-Meter. This meter is so fast that a patient's condition can be watched during treatment. Heart of the instrument is an accurately polished glass wedge, graded in color, against which the blood sample can be matched. The Hb-Meter is a creation of American Optical Company.

PROBLEM: To keep movie film from catching fire

American Optical

ANSWER: *Right*, film shielded by ordinary glass catches fire. *Left*, AO heat-absorbing glass prevents fire. This glass, developed for floods and projectors, absorbs 90% of heat from projected light, passes movie-film color in true values. Write us about your development problems. American Optical Company, 68 Vision Park, Southbridge, Mass.

ENGINEERED BELTING CUTS COSTS 50%



■Ten years ago an Eastern foundry tried and discarded four different types of conveyor belting. Extremely hot core sand made replacements frequent and expensive. An Imperial Belting engineer analyzed the operating conditions and recommended Imperial's INSULATED SAHARA, a belting manufactured especially for carrying hot, abrasive materials. Insulated SAHARA outlasted all belts previously tried by **2 to 1.** Since 1939 no other brand of belting has been used.

Unexcelled for Hot Materials

Made of 37½ ounce tight woven duck combined with asbestos and special insulating material and then impregnated. Insulated Sahara handles materials from 300° F. to 450° F.; Super-Insulated Sahara, from 450° F. to 600° F. Imperial's double-stitched, Inner-Locked construction positively prevents ply separation.

Write for Data Sheet 47-8 and prices.

IMPERIAL BELTING CO.

1755 S. Kilbourn Ave., Chicago 23, Ill.

Imperial
INNER-LOCKED
BELTING
Engineered Belting—
The Right Belt for Each Job

With the EDITORS

THREE Score Years: Editorial comment in this issue on the 60th anniversary of the founding of this publication is much more subdued than was the case at the time of our 40th and 50th birthdays. Back in 1932, a four-page insert reproduced a photograph of John A. Penton, our founder, and three pages from the first issue dated September, 1892. Then for 12 issues, special articles were presented which reviewed the happenings during various periods in the life of FOUNDRY. In 1942, we stopped long enough in our reporting of preparations for war to do an editorial spread on the golden anniversary. In 1952, the cover and one editorial page "Mark 60 Years of Service to a Basic Industry." Nevertheless, the folks on FOUNDRY look back with a great deal of pride and forward with considerable pleasant anticipation.

—o—

Many Friends: It is doubtful if Mr. Penton had any idea back in 1892 that the magazine he was about to launch would continue to grow as both the servant and champion of the industry for so many decades. Early in September of that year, and just before the first issue appeared, he wrote to a friend, "While it is a huge and responsible task for a young man without capital, yet I have what very few men in the foundry business possess, and that is a large number of friends in various parts of the country who, I am sure, will help all they can to make it a success." While correspondence that followed indicated the young man continued to be low in capital for some time, he did find many friends who were ready and willing to prepare articles, send in news items, subscribe or advertise. And all through the years, FOUNDRY has been blessed with many, many friends among castings producers and allied industries.

—o—

A Welcomed Challenge: Age for a publication need not have the same connotation as for individuals. Many publications seem to acquire the secret of perpetual youth and vigor, a reflection perhaps of the vitality of the passing parade of men and women who edit the magazine and serve on its business staff. From the beginning under Mr. Penton, down through the years many have contributed of their talents, and the future will find many others equally enthused with the prospect of carrying the torch for the development of the casting industry. Because we believe so thoroughly in the importance of castings in our scheme of civilization, the challenge of the future in continuing to serve the foundry industry is most inviting.

—o—

Special Position: The slight pause to mark the passing of another decade in the life of this publication gives staff members an excuse to indulge in the interesting pastime of

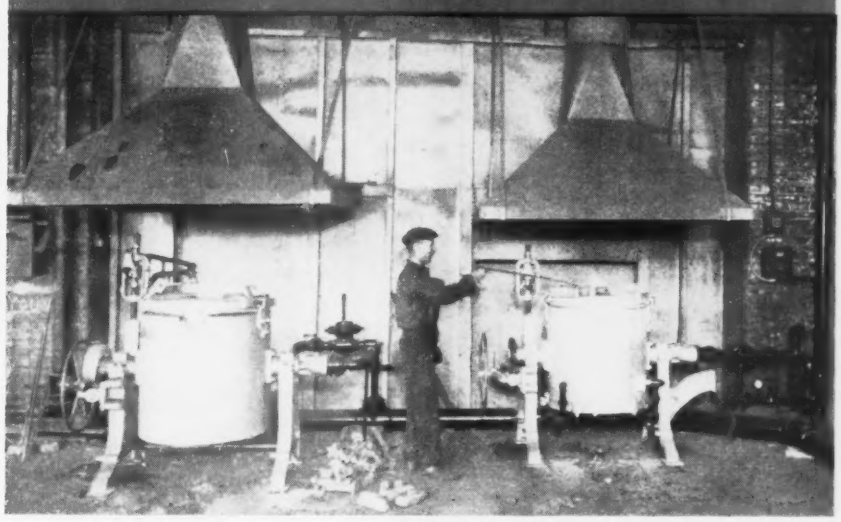
going back over past issues. We are quite fortunate in having a complete file from Vol. I, No. 1 to the present time in the editorial office. These pleasant glimpses into the past always develop some interesting information on the industry and the publication. For example, we have been impressed with the fact that one advertiser appearing in the first issue has occupied one special position for a greater number of issues than any other. An advertisement of Frederic B. Stevens Inc., Detroit, appeared on the inside back cover of the first issue in September, 1892, and with the exception of the period from July, 1895 to August, 1908, has appeared in every issue of FOUNDRY in that position. During the time that the Stevens advertisement was absent from the inside back cover, it ap-

(*Concluded on page* 12)

CONTROL !

ONLY CRUCIBLE MELTING GIVES THE CLOSE CONTROL OF FURNACE ATMOSPHERE SO ESSENTIAL TO MEET MODERN METALLURGICAL REQUIREMENTS.

CRUCIBLE MELTING



Photograph courtesy The Campbell Hausfeld Co., Harrison, Ohio. Installation E. W. Bliss, Brooklyn, N. Y.

"The best melt qualities were obtained by exposing the melt to oxidation"—fourth A.F.S. Foundation Lecture, 1946.

Such conditions or other desirable melting requirements can be met best with Crucible furnaces.

CRUCIBLES FOR CONTROL

CRUCIBLE MANUFACTURERS ASSOCIATION

27 WILLIAM STREET, NEW YORK 5, N. Y.

THESE FIRMS CAN TAKE CARE OF ALL YOUR REQUIREMENTS FOR CRUCIBLE MELTING

LAVA CRUCIBLE-REFRACTORIES CO.	AMERICAN REFRACTORIES & CRUCIBLE CORPORATION	JOSEPH DIXON CRUCIBLE CO.
VESUVIUS CRUCIBLE CO.	ELECTRO REFRACTORIES & ABRASIVES CO.	ROSS-TACONY CRUCIBLE CO.

Top production "in store" for the Grinding Department

SIMONDS ABRASIVE CO.

Grinding Wheels

More production per grinding wheel dollar! That's what's in store for YOU . . . at your Simonds Abrasive Company's distributor's.

He is part of Simonds distributor network reaching every major industrial center in the country. He knows your grinding operations and carries the wheels that meet your needs for speed, economy and top productive efficiency. And even if your jobs are highly specialized requiring special wheels, he'll arrange to have a Simonds engineer survey your operations. No cost to you.

Let us send you the name of your Simonds distributor, together with our grinding wheel data book. Write.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

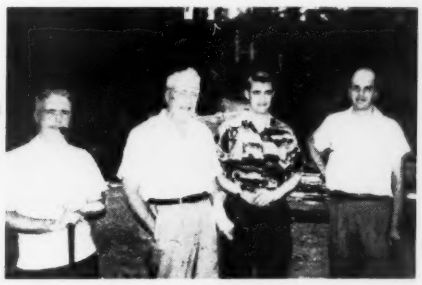
Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(Concluded from page 10)

peared in the regular run of paper in most issues. The accompanying illustration shows the Stevens advertisement in the first issue. FOUNDRY is proud to have had the opportunity of working for the Stevens organization in the merchandising of its products, all of these years, and we have enjoyed greatly doing business with the late Frederic B. Stevens, the founder of that company, and with W. J. Cluff, who succeeded Mr. Stevens as president and continues to guide the progress of that organization.

—o—

Hole In One: Dud Walker, managing director of the Eberhard Mfg. Co. Division of Eastern Malleable Iron Co., Cleveland, became the member of one of the most exclusive clubs



of America when he shot a hole-in-one during the Malleable Founders' Society golf tournament at the Homestead. The illustration, taken by Bill Kennedy of Grinnell Co., shows Thomas A. Scanlon, Eastern Castings Division; Dud Walker; Charles M. Brennan Jr., New Haven Malleable Iron Co., and William T. Cole, Canton Malleable Iron Co. just before the famous game.

—o—

Honored: During the recent ASTM Fiftieth Anniversary convention in New York, Jerry Kanter, directing engineer, Engineering Laboratories, Crane Co., Chicago, was given an Award of Merit in recognition of his "consistent and constructive work in standards and research over many years." He has served on Committee A-1 on Steel, and on other committees in the ferrous and nonferrous metals fields. Congratulations, Jerry, on a recognition richly deserved.

—o—

Back to Work: As this is written, several of the staff members have returned from vacations, three are enjoying the relief from the daily grind, and the editor plans to leave in another week for a rest at a lake in northern Indiana. All of us will be back and ready to attend the many foundry meetings scheduled for the fall season. We will be seeing you. —F.G.S.

When you have an eye for quality....nothing but the finest is ever acceptable

Courtesy of DeBeers Consolidated Mines, Ltd.

FERRO-SILICON - 50 - 65 - 75 - 85 - 90%
LOW CARBON FERRO-CHROME SILICON
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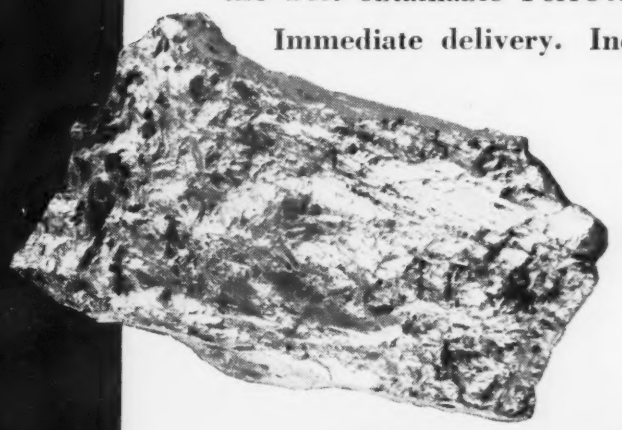
CORPORATION

has, for the past quarter century, offered the iron and steel industry the best obtainable Ferro-Alloys.

Immediate delivery. Inquiries are invited.



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DENVER, COLORADO—Metal Goods Corporation.

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MEXICO—CIA. Proveedora de Industrias, S. A. Mexico, 6, D. F., Mexico.

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NORTHWEST AREA — E. A. Wilcox Company, Arctic Building, Seattle 4, Washington; Phone Mutual 1468.

BIRMINGHAM DISTRICT—Schuler Equipment Company, First National Building, Birmingham, Alabama.

today's best buy is better air!

Inset: Cross section of Type N ROTO-CLONE Hydro-static precipitator with double impeller.

Type N ROTO-CLONE exhausts fine dust from portable grinding operation at the American-Standard plant in Louisville.

ROTO-CLONE collects fine grinding dust ...improves worker efficiency

Fine dust from portable or flexible shaft grinding can seriously affect production. If uncontrolled, the fine particles produced by these operations remain suspended over long periods, and in many instances create a visible fog of floating dust. Such a condition reduces both operator efficiency and unit production.

American Radiator and Standard Sanitary Corporation eliminates this dust problem from their workrooms with AAF Type N *ROTO-CLONES. These versatile *hydro-static precipitators* efficiently exhaust, separate and store dust in one compact unit. The exclusive design of the Type N ROTO-CLONE also provides uniform air delivery and assures sufficient air flow at hoods and unvarying velocities in ducts and branch pipes at all times.

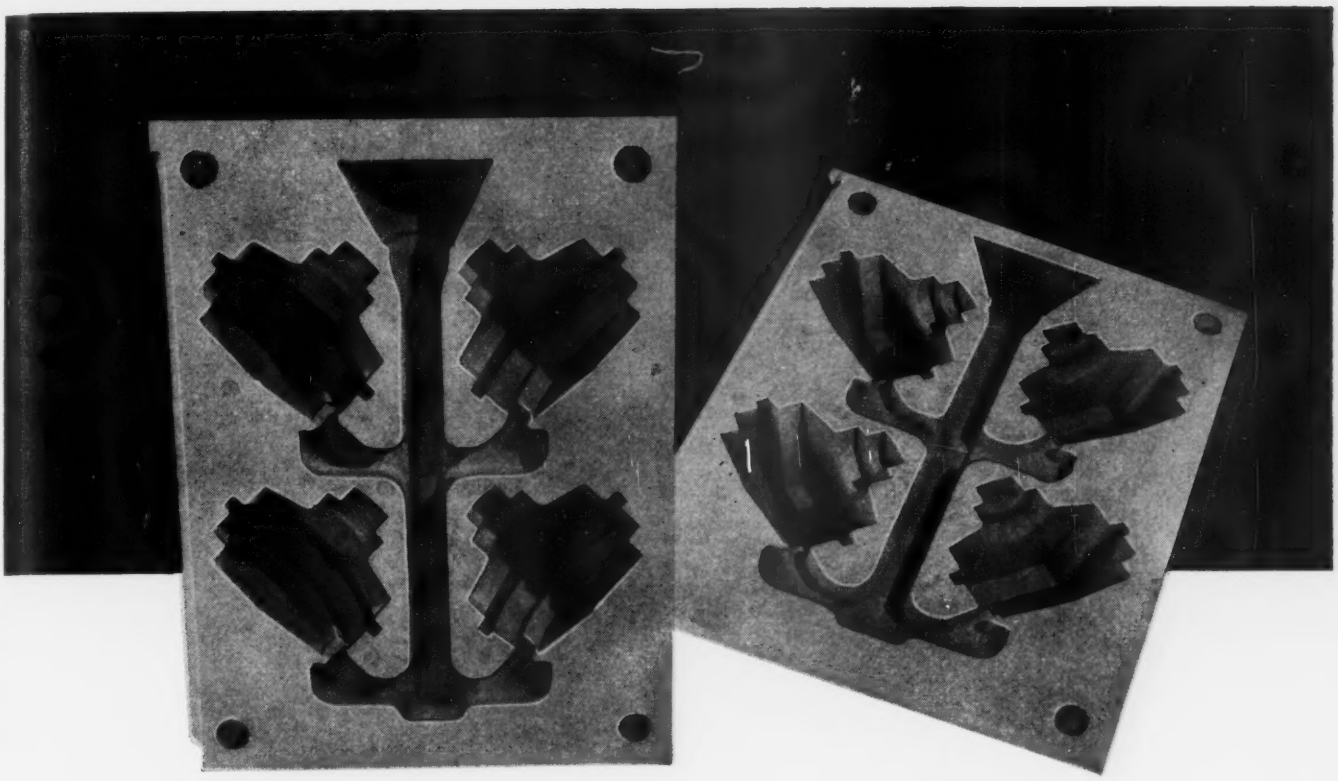
Here's another big plus! The ROTO-CLONE's high efficiency allows recirculation of cleaned air back to working areas, thereby saving heat loss.

To improve efficiency on grinding, buffing or similar operations investigate the complete line of ROTO-CLONE dust collectors. Call your nearby AAF representative or write direct to us for Engineering Bulletin No. 277-A.

**ROTO-CLONE* is the trademark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

American Air Filter
COMPANY, INC.
266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, Cal.

AAF



SHELL MOLDING

with BAKELITE Phenolic Resins offers 2-way benefits

Shell Molding can help you set new production records. Your customers, the users of ferrous and non-ferrous castings, profit too. The process utilizes smooth, lightweight, thin shell molds made of fine-grained sands bonded with BAKELITE Phenolic Resins. Here are some of its many advantages:

How Foundries Benefit:

- More good castings per ton of metal poured.
- Finished molds can be stored until needed.
- Ninety to ninety-five per cent less sand is used.
- Molds are easily handled and moved about.
- Laborious surface finishing of castings is reduced.

How Users Benefit:

- Castings have almost pattern-smooth surfaces.
- Pieces are cast to closer finished dimensions—tolerances as close as .003 to .005 inches per inch.
- Higher percentage of sound, uniform castings means fewer rejects.
- Better detail minimizes machining operations.

Data courtesy Walworth Company, New York 17, N. Y.

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PHENOLIC BONDING RESINS

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BAKELITE COMPANY
A Division of
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30 East 42nd Street, New York 17, N. Y.
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Learn More About This Process Now: Mail The Coupon Today!

BAKELITE COMPANY, Dept. EF-29.
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Please mail my free copy of the Booklet C-8, "BAKELITE Phenolic Resins for the Shell Molding Process."

*Name*_____ *Title*_____

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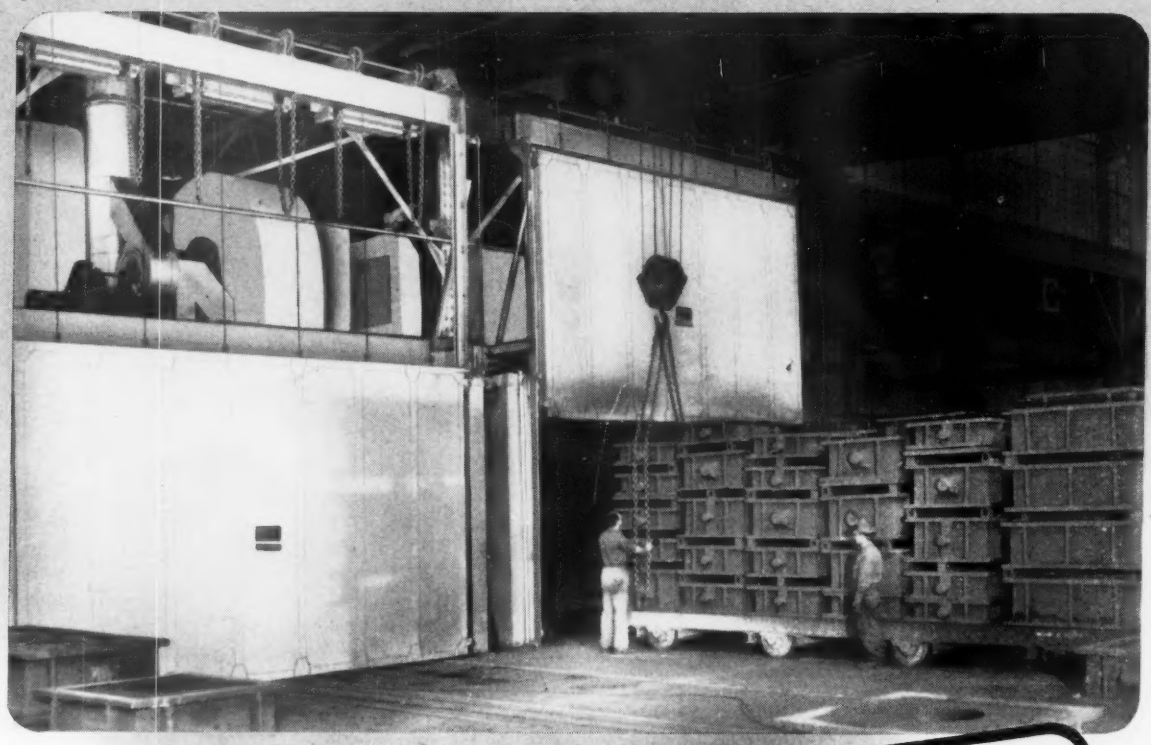
for perfect mold drying
COLEMAN OVENS



Coleman Car Type Mold Ovens in foundry of large engine manufacturer

● Coleman Car Type Mold Ovens dry molds with the speed and uniformity required for increased production of quality, true-to-pattern castings in dry sand. Perfect drying eliminates mold and casting scrappage, saves valuable materials, time, and manpower.

Coleman Car Type Core Ovens, for large, heavy core work, are the acknowledged leaders in dependable, economical performance... used by leading foundries in every class of heavy castings production.

Coleman Oven Cars are equipped with specially designed roller bearings to carry maximum loads under the severe conditions of foundry oven service. Motorized car haulage equipment can be furnished. Write for Bulletin 48

Only COLEMAN OVENS offer all these advantages:

- PERFECT DRYING AND BAKING eliminate manpower and casting losses due to make-overs and rejects.
- INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.
- HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost.
- GREATEST SAVINGS IN FUEL by using the most economical fuel available.
- MOST ECONOMICAL CORE BINDERS for your particular casting requirements, oil or resin, can be used.

A COMPLETE RANGE OF TYPES: COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD — CLEVELAND 13, OHIO

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WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Barrett announces

R-146

a new, powdered resin developed especially for shell molding

designed for high speed production

- Rapid investment
- Uniform cure
- Increased strength
- Excellent fidelity to pattern
- Clean finish
- No peel or fall-back

Clip this convenient coupon to your letterhead for test samples of R-146 or the services of Barrett Field Engineers.

☐ *Please send me a sample of Barrett's new resin—R-146—designed for high speed production of shell molds.*

☐ *Please have one of Barrett's Field Service Engineers call to discuss applications of shell molding in our operation.*

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ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

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SMALL FOUNDRIES agree:

"It's good business to install a cost-saving WHEELABRATOR®*"*

Are you putting off modernizing your cleaning room because you believe your tonnage is too small to justify a Wheelabrator? Many foundry owners, who once shared this belief, now say they couldn't afford to operate without their Wheelabrator. They have discovered that, "It's good business to install a cost-saving Wheelabrator."

Here's how the WHEELABRATOR will save for you—

Saves Time—Speeds Production. Wheelabrator speed cleaning saves many costly man hours in cleaning time, releasing manpower for other work. It handles a greater quantity of castings and cleans them better in much less time.

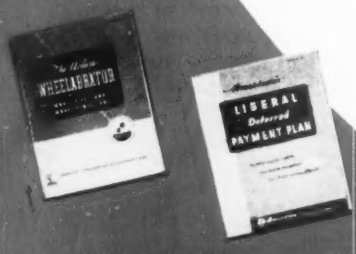
Provides Competitive Advantages. A Wheelabrated finish—all sand and scale are removed right down to the virgin metal—is an important sales factor. More and more firms are demanding this surface cleanliness.

Creates New Sales Opportunities. Wheelabrator's fast, thorough cleaning puts your services on a par with competitors. Castings are delivered faster to your customers.

Profitable Job Cleaning Possible. Many foundries utilize their Wheelabrator part time for job cleaning providing a new source of business and real extra profits.

Returns Investment Quickly. Savings effected are usually sufficient to amortize investment in from six to eighteen months.

Other Important Advantages. Valuable space made available, decreased casting rejects, improved foundry efficiency, and better working conditions.



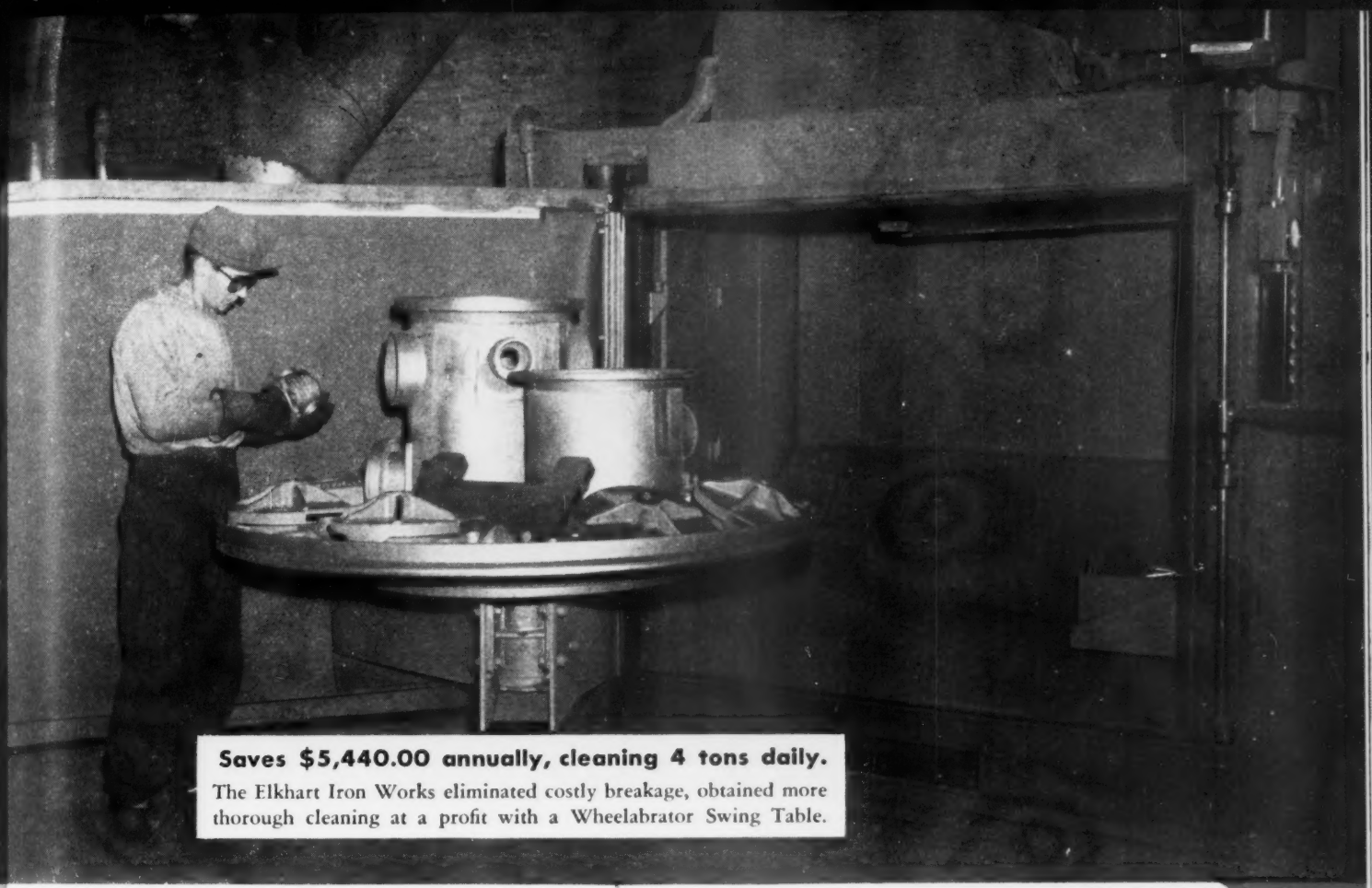
FOR BEST RESULTS—

always use TruSteel Shot in your blast cleaning equipment. The only perfected TruSteel Shot, it holds its shape longer to reduce cleaning costs. Send today for descriptive booklet No. 59-A.

SEND for this literature—

Catalog 74-A **describes the Wheelabrator method and shows what it is doing for others.**
Bulletin No. 26. **Wheelabrator's liberal deferred payment plan lets you reap the benefits of the equipment immediately at the lowest possible initial cost without dissipating your working capital.**

WORLD'S LARGEST BUILDER OF AIRLESS BLAST



Saves $5,440.00 annually, cleaning 4 tons daily.
The Elkhart Iron Works eliminated costly breakage, obtained more thorough cleaning at a profit with a Wheelabrator Swing Table.

Here's how the WHEELABRATOR has saved for others—

Saves $7.06 per ton. The Keystone Brass Works, Inc., slashed cleaning costs 67% with a Wheelabrator Tumblast. Annual production only 550 tons.

Saves 18 man-hours per ton. Wheelabrator Swing Table eliminated 4 chippers and grinders, saved $4,644.00 annually cleaning only 43 tons monthly for a Canadian steel foundry.

Saves $2.31 per ton. Cleaning only 1.92 tons daily, a Wheelabrator Tumblast effected savings more than sufficient to repay investment for the Welsbach Corp. A 45 minute wet tumbling job is now cleaned in three to four minutes.

3 Molder Shop Saves $2250 Annually— Paterson Brass Mfg. Co. reduced daily cleaning room man hours from 16 to 2 by installing a Wheelabrator Tumblast to replace wire brushing.

POPULAR MACHINES used in SMALLER FOUNDRIES

Wheelabrator Tumblasts—Made in eight standard sizes (1 cu. ft. to 63 cu. ft.) for cleaning castings sufficiently rugged to withstand a gentle tumbling action. There's a Tumblast just right for your job.

Wheelabrator Swing Tables—Particularly suitable for the foundry with a low daily volume of a wide range of large and small castings. The most versatile cleaning machine ever built. Hundreds in use.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

American

WHEELABRATOR & EQUIPMENT CORP.
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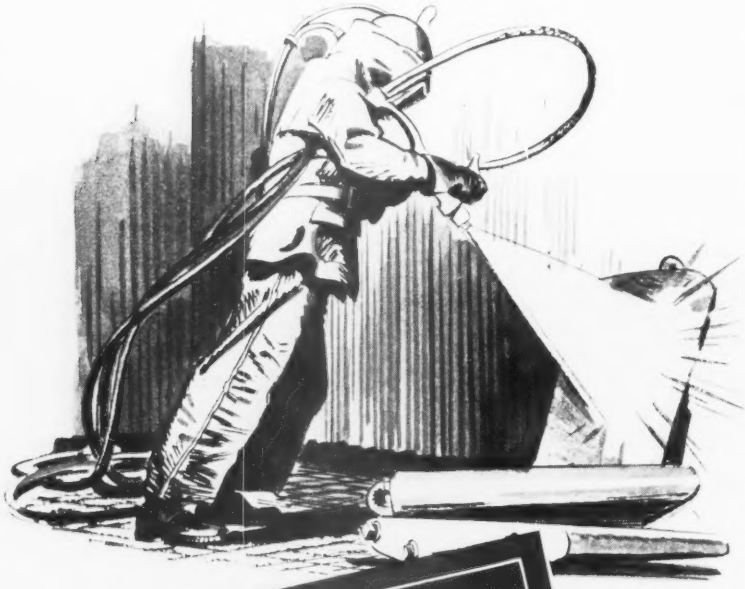
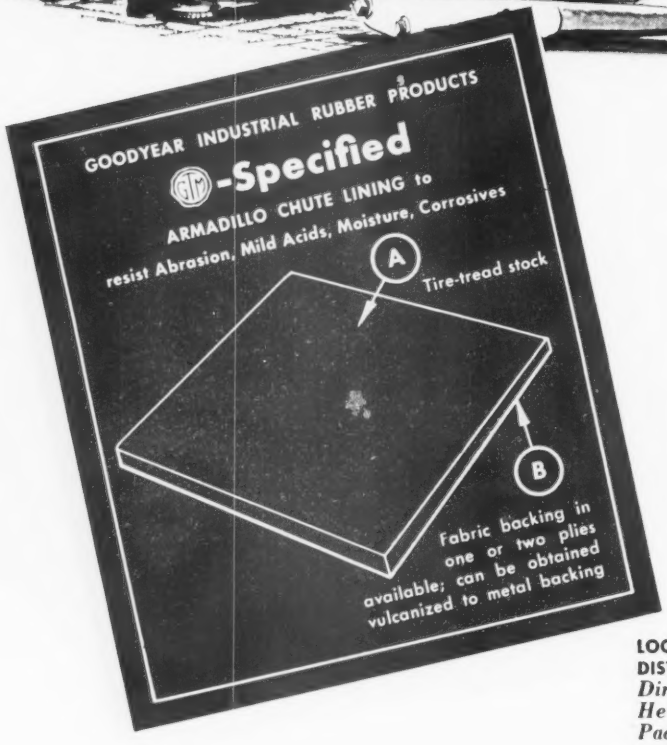
LEANING EQUIPMENT

STOP ABRASION- with RUBBER LINING

and look what you'll save!




GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified
ARMADILLO CHUTE LINING to
resist Abrasion, Mild Acids, Moisture, Corrosives
A
Tire-tread stock
B
Fabric backing in one or two plies available; can be obtained vulcanized to metal backing

IN sand blast chambers, Armadillo Chute Lining has been used as a wall interliner, reducing maintenance costs as much as 75%—

the life of sand sluices and rock chutes has been multiplied as much as 12 times —

and wherever chute, trough or wall abrasion is a problem, Armadillo Chute Lining can cut *your* costs.

Reason for this outstanding resistance to abrasion is the compounding of Armadillo Chute Lining, as specified by the G.T.M.—Goodyear Technical Man. It is comparable in resistance and quality to the tread stock used in making premium-grade Goodyear tires—"tread-tough" to bounce away abrasion. It can be nailed, bolted or pegged into place — can be lapped, butted or spliced. Armadillo Chute Lining can be readily cut with a *water-lubricated* hand knife or power wheel or die-cut to fit unusual shapes.

On new or special applications of Armadillo, especially where corrosives or temperatures nearing 150° F. are involved, the G.T.M. is particularly ready to discuss your needs. You can reach him for these applications—as well as standard uses—by writing Goodyear, Mechanical Goods Division, Akron 16, Ohio.

LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls built to the world's highest standard of quality.*

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We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network

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It's new Curtis

MODEL 98 AIR COMPRESSOR
Two Stage Air Cooled 15 and 20 Horse Power

designed to give you **even greater dependability**
lower cost operation
longer life

Features that make the number 98 compressor truly outstanding:

1. Two-Cylinder Compressor — less friction and less oil consumption
2. Vibration Free — smooth operation
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4. Timken Main Bearings — provide easy external adjustment
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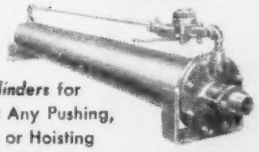
9. Also furnished in both base and tank mounted units

Mail coupon for additional information

Other CURTIS Equipment that Increases Plant Efficiency—Reduces Production Costs

Vertical Air Hoists for Low Cost Lifting or Lowering of Materials or Machines



Air Cylinders for Almost Any Pushing, Pulling or Hoisting Operation

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
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I am interested in items checked below:

☐ THE NEW MODEL 98 AIR COMPRESSOR ☐ VERTICAL HOISTS ☐ AIR CYLINDERS

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Other Curtis Compressors available in sizes from ¼ to 50 horsepower inclusive.

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Bill— you can cut drying time with Mogul!

LARGEST SELLER IN THE FIELD!

Kordek, the preferred dry bond for cores . . .

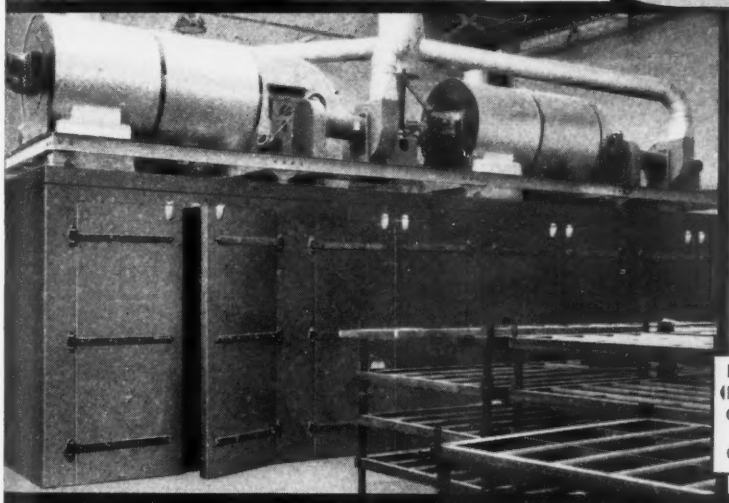
• MAKES SMOOTHER CORES • CUTS DOWN DISCARDS

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

Write Technical Sales Department

CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, N. Y. 4, N. Y.

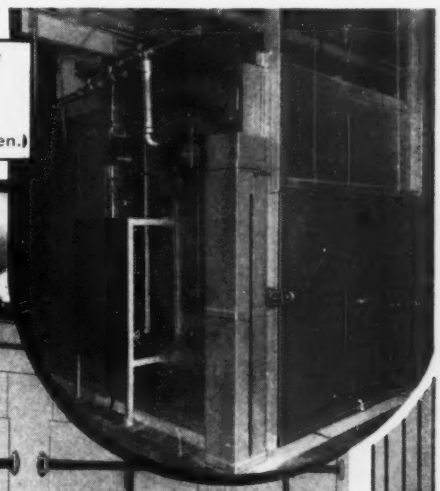
Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO



The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

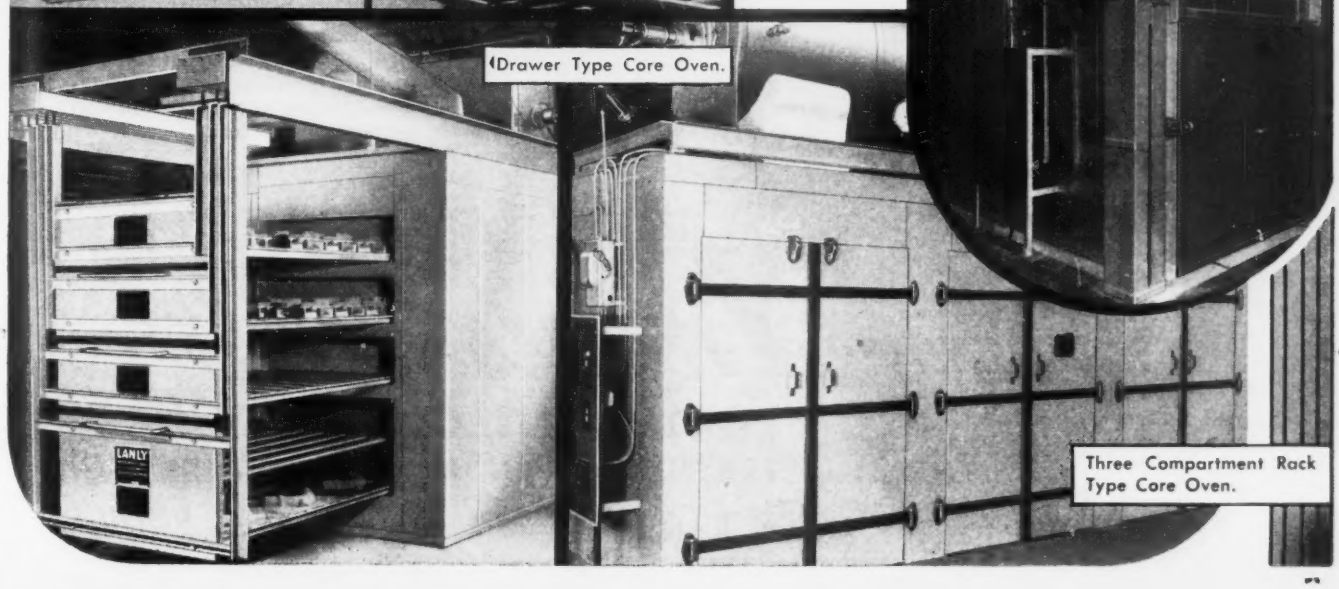
Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.



Four Compartment Rack Type Core Oven.

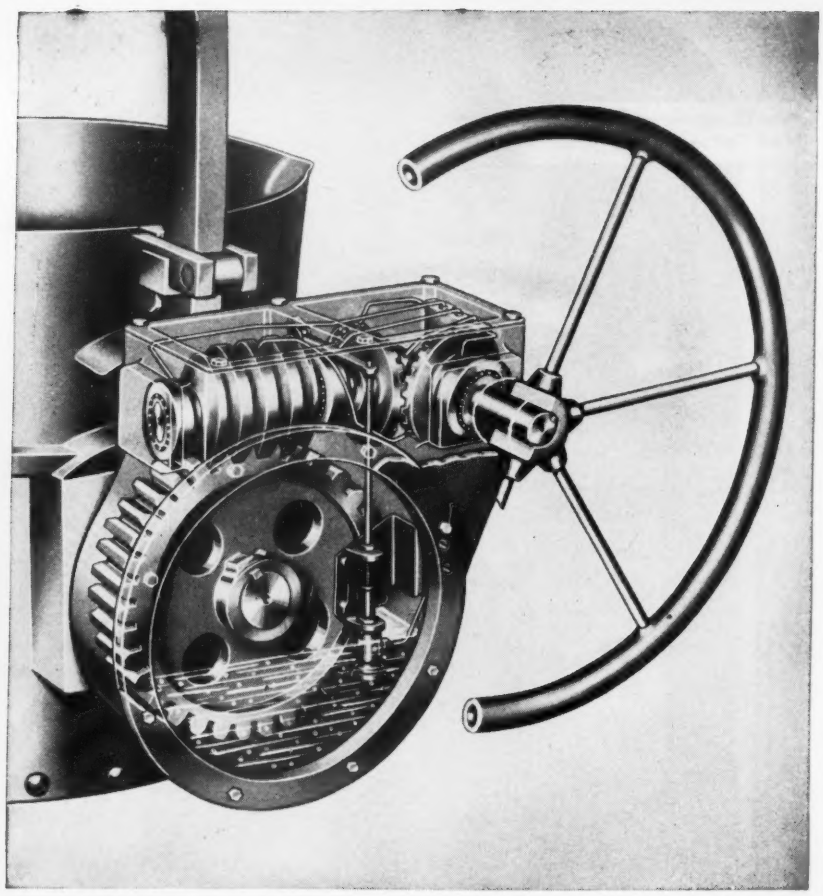
Car Type Core Oven.



Drawer Type Core Oven.

Three Compartment Rack Type Core Oven.

This Worm Ladle Gearing ELIMINATES GASKET ADJUSTMENTS



. . . WORM AND BEVEL GEAR ASSEMBLY COMPLETELY ADJUSTABLE

Here is another Industrial Equipment Company first . . . new, improved worm ladle gearing bringing *complete universal adjustability.*

Take a close look at the phantom view. Here is a one-piece, self-contained unit with all parts easily accessible. Your maintenance man can quickly make back-lash adjustments to pin-point accuracy and positive adjustment by adjusting the bearing lock nuts on all gears and worm. These nuts are easily reached and with working space to spare.

Unaffected by Heat

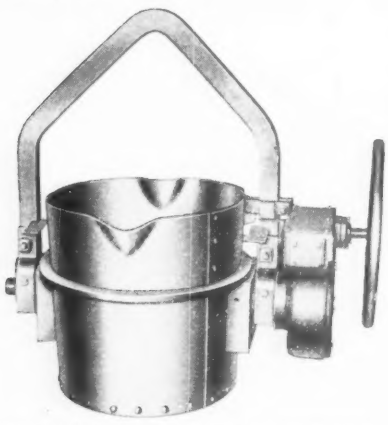
There is no connection between the bail and the gearing. No clearance for heat distortion is necessary, permitting an assembly almost to machine tool precision.

Industrial's new gearing is absolutely safe and positively self locking. The high ratio between worm and worm gear locks the ladle in any position. Incidentally, worm and bevel gears are of high tensile semi-steel and the worm is of high alloy steel. All are precision cut. Shafts are mounted on anti-friction bearings.

Now Standard Equipment

All Industrial geared ladles are now supplied with this outstanding new type of gearing. In addition, this gearing can be supplied for any Industrial worm geared ladles now in operation. *Write for details.*

- **Completely enclosed and self contained**
- **Automatic force-feed lubrication**
- **Positively self locking in any position**
- **Precision cut gears**



Model 592T ladle with new type gearing. Also notice use of Industrial Equipment's much talked-about UNIVERSAL BAIL. This bail completely eliminates binding due to heat distortion or misalignment.

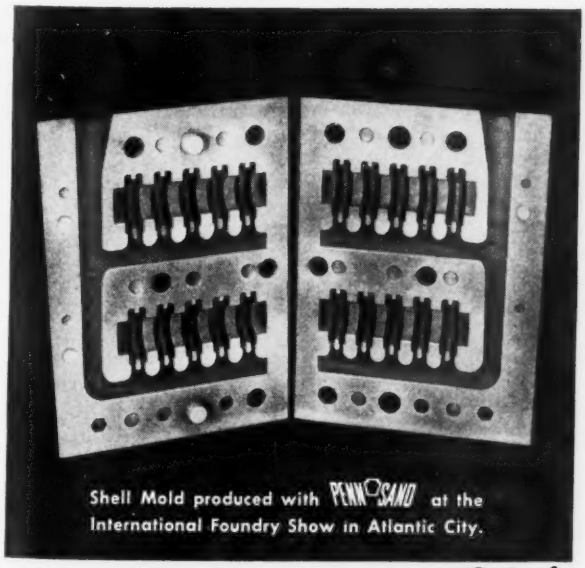
Do you have our revised catalog No. 35?

Industrial
EQUIPMENT COMPANY
115 N. Ohio St., Minster, Ohio

LADLES • BOWLS • SHANKS • BAILS • TONGS • SPECIAL EQUIPMENT

SHELL-MOLDING PENN SAND

OFFERS YOU 7 Big Advantages



Shell Mold produced with PENN SAND at the International Foundry Show in Atlantic City.

1. WIDE SCREEN DISTRIBUTION—Produces castings of exceptional finish.

2. IDEAL A.F.S. FINENESS—Cuts costs by requiring use of less resin.

3. LOW CONFINED EXPANSION—Aids mold stability, reduces rejects.

4. UNIQUE GRAIN STRUCTURE—Gives excellent permeability, eliminates gas problems.

5. HIGH REFRACTORINESS—Facilitates pouring, prevents surface defects.

6. ABUNDANT SUPPLY—Insures immediate shipment of your orders.

7. LOW COST—Priced economically for both bulk and bagged shipments.

MAIL COUPON TODAY FOR MORE Details

PENNSYLVANIA GLASS SAND CORPORATION

Gateway Center • Pittsburgh, Pa.

Eastern Sales Office: Trenton Trust Bldg., Trenton, N.J.

Use **PGS** Crushed Quartzite, your best suited and least expensive back-up material.

PENNSYLVANIA GLASS SAND CORP.
140 Stanwix St., Gateway Center
Pittsburgh 22, Pennsylvania

Please send me, without obligation, more details on Shell-Molding PENN SAND.

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STREET_____

CITY_____ ZONE____ STATE_____

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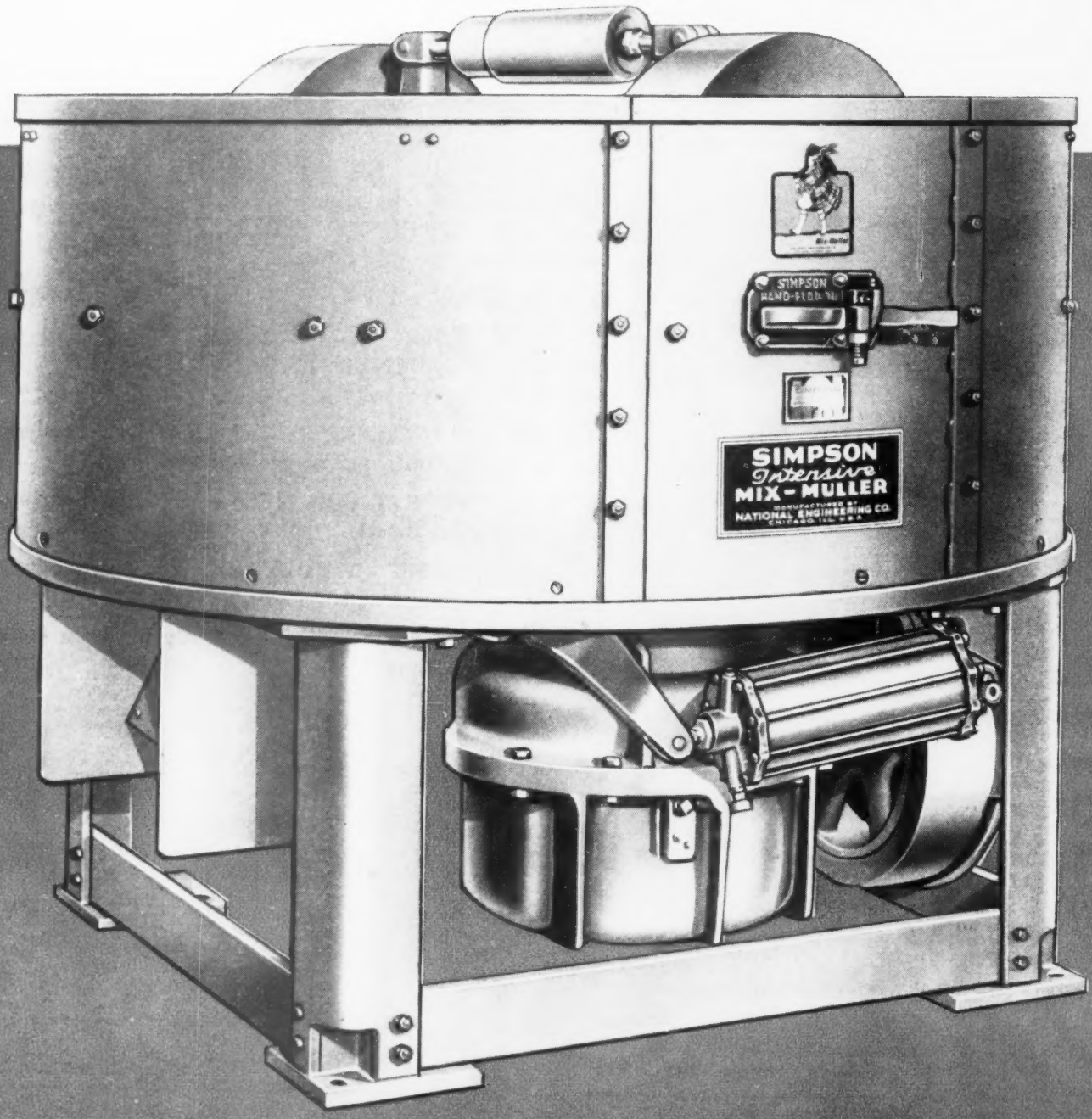
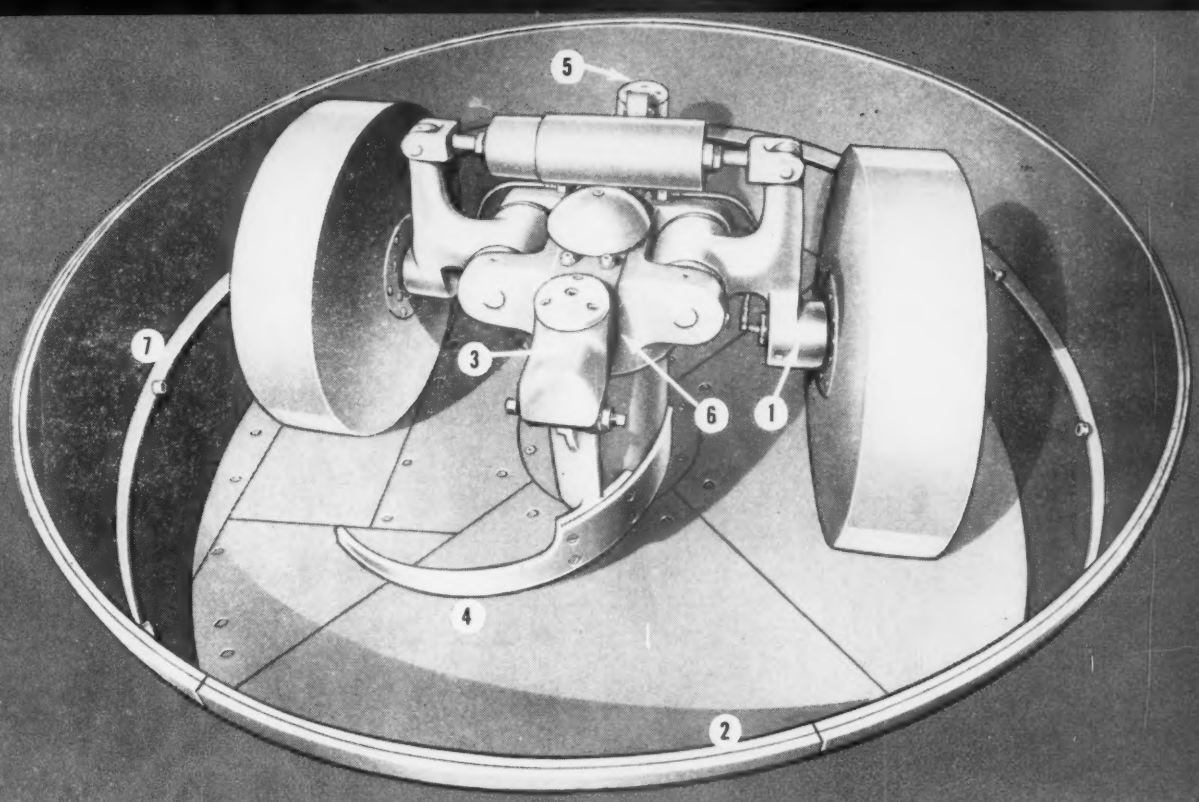
FAST...SIMPLE MAINTENANCE

... years of trouble-free service assured with the Big Capacity 2F and 3F SIMPSON *Intensive* Mix-Mullers





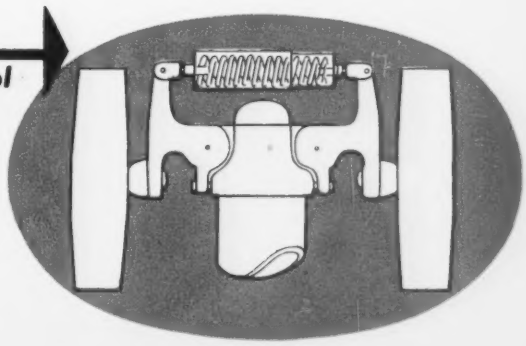
. . . Check these *7 Easy-Maintenance* features:

1. Mullers mounted on hubs containing bearing assembly. (Complete hub replaceable without removing muller from mixer.)
2. Muller crib has removable section through which all rotating machinery can be removed without interfering with overhead hoppers, structures, etc.
3. Inside and outside plows adjustable vertically and radially by positive screw device on upper end of plow brackets . . . without entering mixer.
4. No tapped holes . . . wearplate bolted to bedplate by through bolts . . . easily tightened or removed from underside by one man.
5. Mullers, center shaft, and rocker arm bearings are lubricated by centralized system from Alemite fittings accessible from outside mixer.
6. Speed reducers, turret, mullers and rocker arm assemblies each may be removed as self-contained units, without exposing bearings.
7. Crib liner clamped to crib — no bolts through liner.

For complete details on Simpson 2F and 3F Intensive Mix-Mullers, write for BULLETIN 511

SPRING-LOADED Mullers

The Secret of Better Sand Control



• The comparatively lighter mullers with adjustable spring pressure, as used in the 2F and 3F Mix-Mullers, greatly increase the efficiency of the mulling action, as the pressure can be adapted to the type of sand to be conditioned.

Because of the plow design and the muller suspension, the sand is subjected to much more violent agitation, and is considerably increased in volume. The agglomerate grains are broken up, and a fluffy sand of high flowability results.

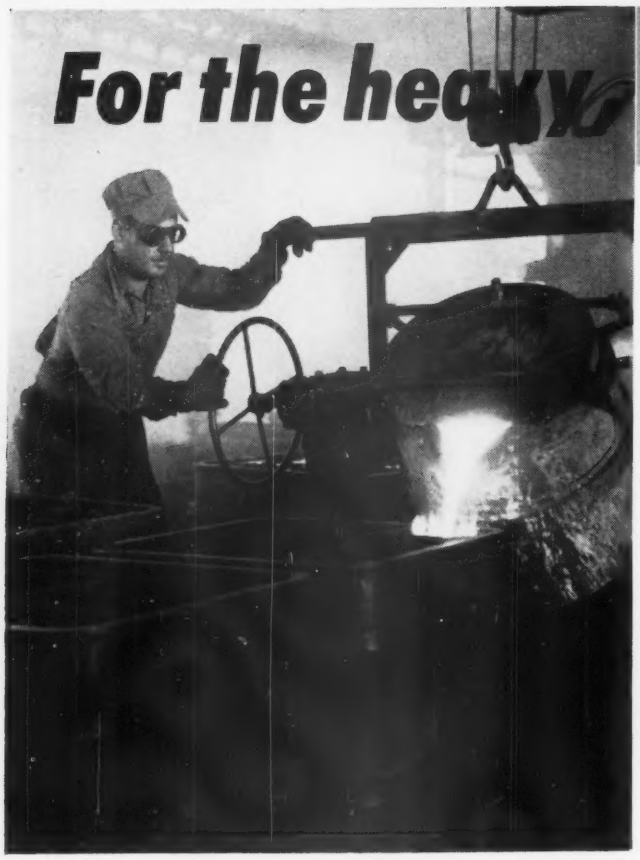
SIMPSON *Intensive* **MIX-MULLERS**

National Engineering Company

608 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents: For Continental European Countries — George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO ,S. De R.L., Mexico, D.F.

For the heavy tough jobs...



200 Foundries Have Converted to BS&B HEAVY DUTY Foundry Flasks

Like any BS&B Foundry Flask, the Heavy Duty is tailor made . . . designed for your particular needs . . . designed to do the best job for you. This is what 200 major foundries have found who have converted to them in the last 15 years.

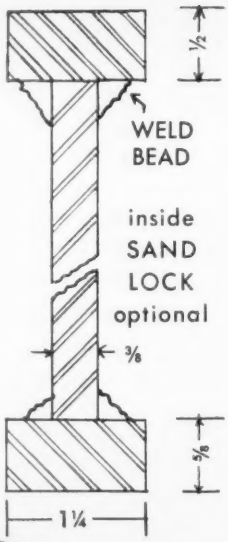
Only BS&B gives you all three of these features in a heavy duty flask—bearing strips welded both inside and out, cast steel trunnions, and cast steel pinlugs and clamplugs. In addition, it's the only flask offering a minimum of weight for easy handling, considering the material used to give it the greatest rigidity. These 200 foundries who have converted to the BS&B Heavy Duty Flask have recognized the economy of having the best equipment for the job . . . of enjoying minimum maintenance and replacement as the years pass.

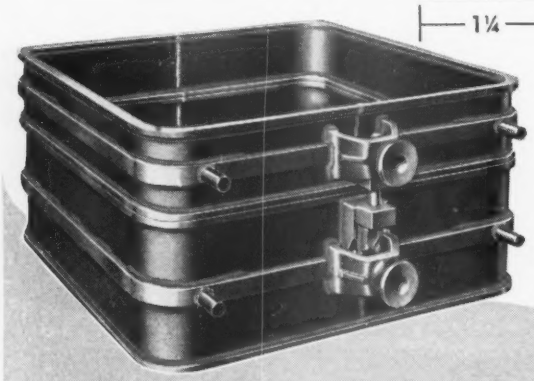
BS&B Foundry Flasks are designed by foundrymen . . . fabricated by skilled workmen using quality materials. They're constructed entirely of steel . . . sections surface ground, or machined both top and bottom, for tight joint at parting line. You, too, will profit from the many advantages of this heavy duty flask. Write for your FREE copy of the BS&B Foundry Flask Handbook.

Foundry Flask Division
Dept. 7-AR9

Cross Section of Style FP 22
showing wall thickness, bearing bar size and welding. The reinforcing rib is optional, and is designated as Style FP 22R.

BS&B Heavy Duty Flask Style FP 22R
has solid bar reinforcing rib wherever required, particularly on large or deep sections. Like all BS&B Foundry Flasks, this style is available in round, square, rectangular and special shapes. Thickness of wall, size of bearing bars and reinforcing ribs are optional depending on individual foundry requirements.





BLACK, SIVALLS & BRYSON, INC.
7500 East 12th Street — Kansas City 3, Missouri

FOUNDRY OUR 60TH YEAR BS&B FLASKS

Why YOU should use "dag" Dispersions for Parting

"Dag" colloidal graphite dispersions improve reproduction of molds and patterns . . . lengthen mold life . . . decrease rejects. Less finishing of castings is required, often none at all.

The unusually slippery dry film obtained with **"dag"** colloidal graphite is unaffected by any temperature normally experienced in the foundry and forms so thin a coating on molds that you need never fear a change in dimensions of castings.

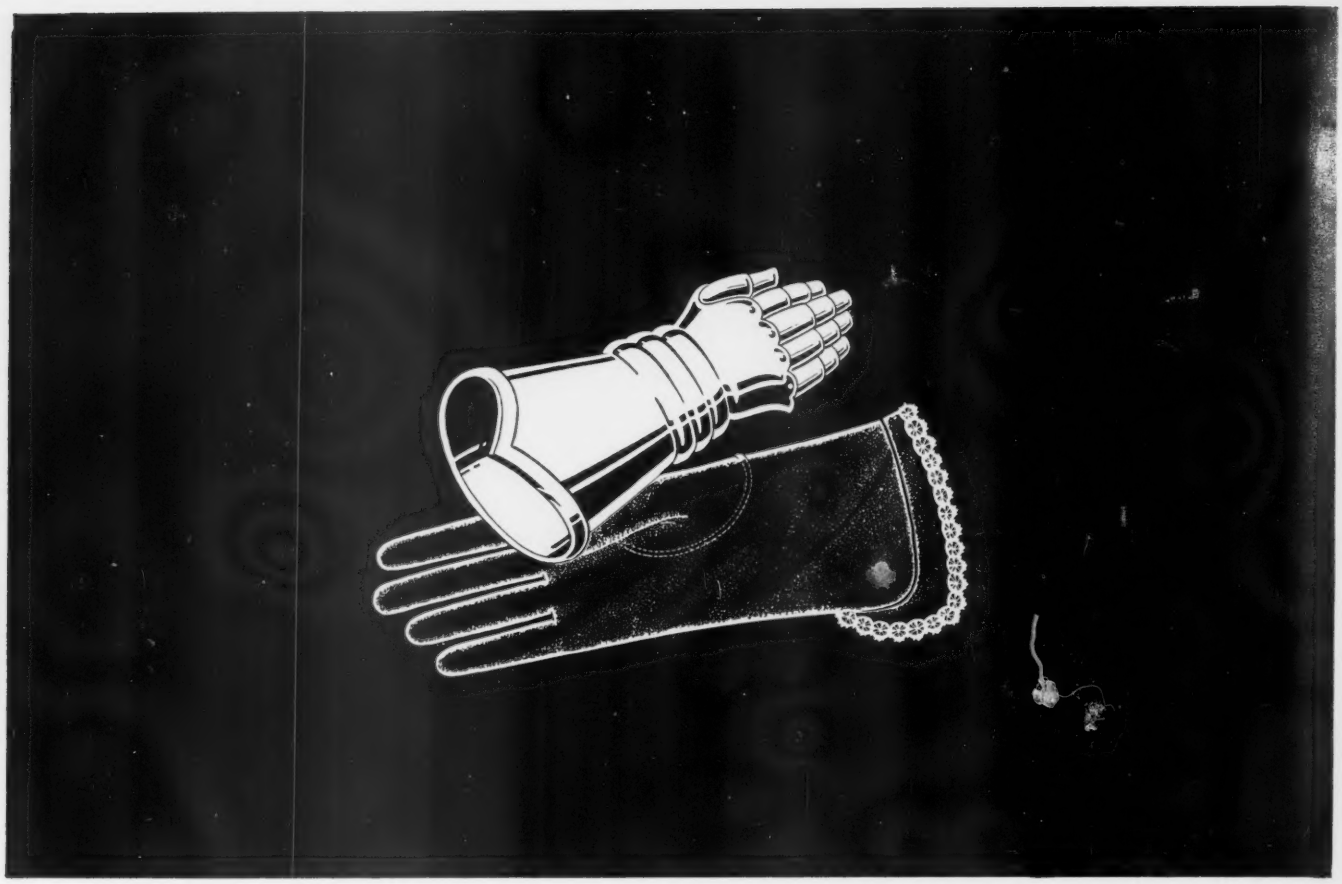
This specially processed graphite is readily applied by spray or brush to chills, molds, patterns, push pins, shoulder screws, flask pins . . . even ladle interiors. Aqueous **"dag"** dispersions also eliminate or reduce the objectionable choking fumes and smoke usually caused by conventional petroleum-base parting compounds, thus improving shop conditions.

For more information on **"dag"** colloidal graphite in the foundry, write for Bulletin No. 425-14J.

dag DISPERSIONS®

ACHESON COLLOIDS COMPANY,
PORT HURON, MICHIGAN

. . . also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND
Units of Acheson Industries, Inc.



THE IRON FIST IN A *Velvet Glove*

Supposing—just supposing—YOU could write the specifications for an ideal blastcleaning chilled shot and grit. What qualities would you specify? You'd want it to be hard, of course, so it would clean fast. But you wouldn't want it so hard as to wear out your equipment at a rapid rate. Neither would you want the shot to be hard AND BRITTLE.

The ideal chilled iron shot and grit would be hard enough to do a fast cleaning job. And, if possible, you would want the hard iron carbides (that do the cutting) imbedded in some soft material that would go easy on your equipment and keep the shot from shattering into small ineffectual fines. What you would want is a sort of an "iron fist in a velvet glove" kind of shot and grit.

It may come as a surprise to you that there *is* such a shot and grit made. A chilled iron shot that holds the iron carbides in a *ductile matrix*—a shot that is hard enough to clean fast, yet soft enough to spare equipment and keep the shot from shattering too quickly. It is National Controlled "T" Shot and Grit.

We're not going to make any wild claims—we know YOU can appreciate the advantages of such shot and grit—providing what we say is true. And we'd like to prove our case *in a matter of minutes*—if you'll let us. Please write your name and address on the lines below and mail the coupon to the nearest Hickman-Williams office. The most you can lose is the cost of postage, but you may profit to the tune of a substantial sum of dollars.

NATIONAL CONTROLLED "T" SHOT AND GRIT *IS PRODUCED EXCLUSIVELY BY*
NATIONAL METAL ABRASIVE COMPANY • CLEVELAND, OHIO
WESTERN METAL ABRASIVES COMPANY • CHICAGO HEIGHTS, ILL.
AND SOLD EXCLUSIVELY BY

HICKMAN, WILLIAMS & COMPANY
(INCORPORATED)

CHICAGO • DETROIT
CINCINNATI • ST. LOUIS
NEW YORK • CLEVELAND
PHILADELPHIA • PITTSBURGH
INDIANAPOLIS

OK. Let's see you prove your point . . .

Name _____

Firm _____

Address _____

City _____

MAIL TO HICKMAN, WILLIAMS OFFICE NEAREST YOU

IT'S THE RESULTS YOU GET, THAT COUNTS!

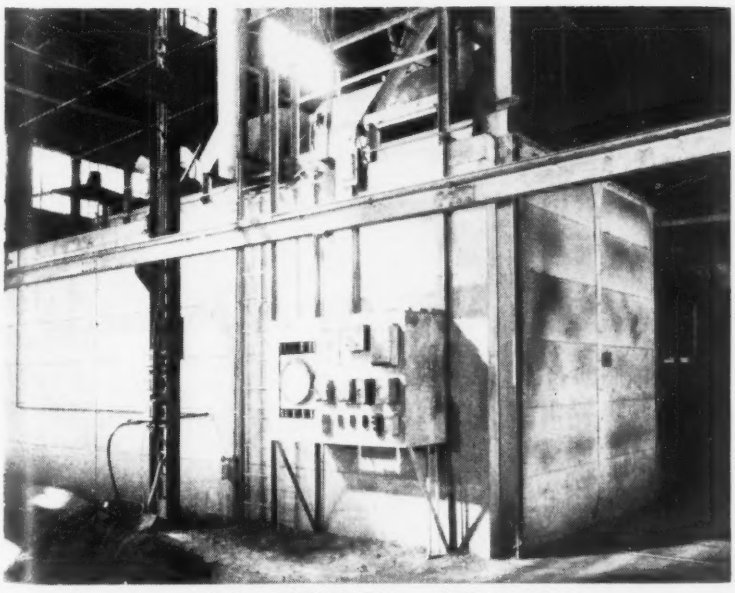
That's Why

CARL-MAYER *Engineering*

is held in so high esteem by outstanding foundries such as those listed below.

CORE *and* MOLD OVENS, *all types*

CARL-MAYER MOLD OVEN at Union Steel Castings Div. of Blaw-Knox Company. Door clearance: 17'-9" wide, 15' high. Depth: 40'. Capacity: 200 tons per bake. Combination gas-oil fired.



One of two CARL-MAYER MOLD OVENS at Oil Well Supply Company. Capacity: 120 tons per bake.

CARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
G. & C. Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

THE CARL-MAYER CORPORATION

3030 Euclid Avenue • Cleveland, Ohio

WE ALSO BUILD OTHER TYPES OF INDUSTRIAL OVENS AND FURNACES

Over thirty years' experience

SAFEGUARD YOUR PERSONNEL and your PROPERTY!

Eliminate dangerous gases, fumes and dust with a MULTI-WASH collector

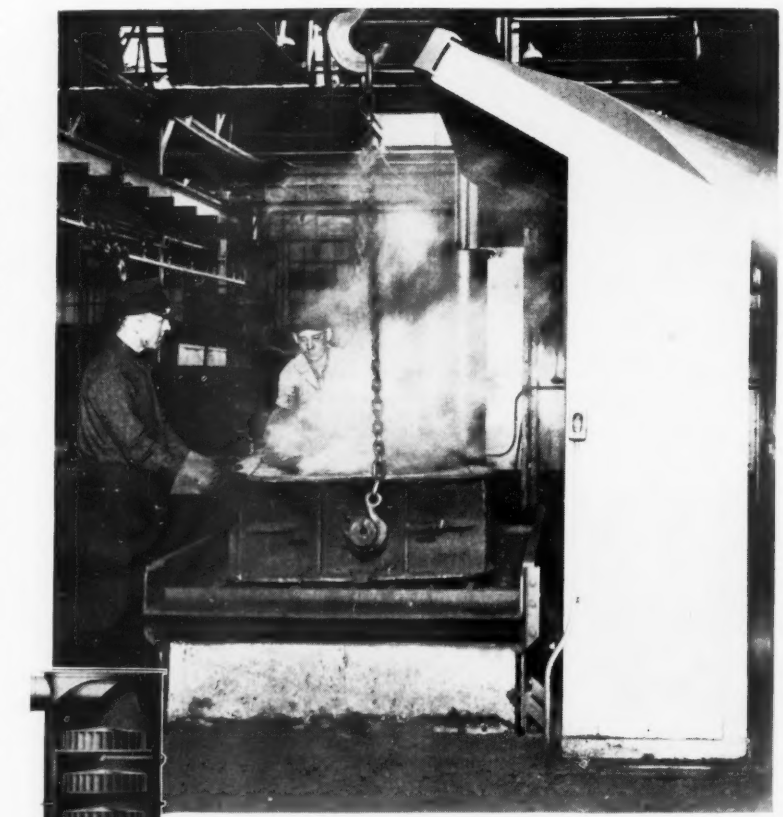
It will pay you to consider the many advantages of a Multi-Wash dust collecting system.

With Multi-Wash you won't have to dig yourself out of accumulated dust particles and furthermore you'll eliminate the danger of a spontaneous fire. Personnel too, will find conditions more agreeable and production will increase, because the cause of sick leave due to ailments attributable to dust and fumes will be substantially eliminated.

You can start in a small way to clean up objectionable dust and fumes by installing a Multi-Wash unit in the most offensive area first. Later, you can add on as conditions warrant.

From a dollars and cents approach you'll be far ahead with Multi-Wash both production-wise and maintenance-wise.

Be wise, contact your local Schneible representative or write direct for a further study of your dust and fume problem.



MULTI-WASH

MULTIPLIES WASHING FOR TOP EFFICIENCY

CLAUDE B. SCHNEIBLE CO.

P. O. Box 81, North End Station
Detroit 2, Michigan

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

SCHNEIBLE

Late Foundry News

AUGUST 26, 1952

STRIKE HELPS COKE: The steel strike was responsible for increasing coke inventories about 2,000,000 tons or more. While blast furnaces were down, many coke ovens continued operating to make contract gas deliveries into city mains, and most others ran at a reduced rate to keep ovens in operating condition. Hence the shortage that was looked for around the middle of next year now appears unlikely to develop before early 1954, according to government officials. Fear of a future shortage stems from a question of whether the coke expansion goal can be met. However, this may be negated by the fact the blast furnace and foundry expansion programs also are behind schedule. Construction of new coke ovens is paced to the supply of refractories and special steel castings.

MORE SCRAP: NPA figures show that 165 leading steel mills and foundries had iron and steel scrap inventories totaling 4,723,000 tons on July 31. This compares with 2,559,000 tons on July 31, 1951, 2,615,000 tons on Dec. 31, 1951, and 3,700,000 tons on Dec. 31, 1950. While the NPA scrap salvage program is inactive, it could be resumed quickly if scrap supplies should dip rapidly.

ALUMINUM FOUNDRY: Chrysler Corp. is planning a new cylinder head foundry for its Tank Engine Division at the Michoud Ordnance Plant, New Orleans. Idle foundry equipment at the former Dodge Chicago Plant will be moved to New Orleans. Dodge Chicago facilities originally included separate aluminum and magnesium foundries to produce parts for B-29 engines. Ford's Aircraft Engine Division now is operating the plant, including the magnesium foundry, but has not produced aluminum castings. The large aluminum foundry during World War II made only finned cylinder heads. It had eight 3000-pound furnaces, melting more than 150,000 pounds of metal daily, and incorporated highly mechanized equipment for mold handling and sand preparation and reclamation.

CERTIFICATES OF NECESSITY: Relatively few foundries are included among companies for which certificates of necessity were approved the last two weeks for new or expanded defense facilities. Earlier lists this month included the following foundries and amounts certified: Cadillac Malleable Iron Co., Cadillac, Mich., $90,300; Rollstone Foundry Inc., Fitchburg, Mass., $27,045; Frederick Iron & Steel Inc., Frederick, Md., $17,300; East Akron Casting Co., Akron, O., $18,984; Wadsworth Foundry Co., Wadsworth, O., $388,161; Minster Machine Co., Minster, O., $24,475; Mansfield Brass & Aluminum Corp., Mansfield, O., $21,000; Ohio Steel Foundry Co., Lima, O., $165,345; Belle City Malleable Iron Co., Racine, Wis., $643,300; American Steel Foundries, East St. Louis, Ill., $151,000; R. H. Osbrink Mfg. Co., Los Angeles, $97,877; Rolle Mfg. Co. Inc., Lansdale, Pa., $323,405.

COPPER-BASE INGOTS: Receipts of copper scrap by brass and bronze ingot makers have been restricted in recent weeks. This may necessitate increased purchases of foreign refined copper. Shipments of copper-base ingots have declined steadily this year, dropping from 49 million pounds in January to less than 31 million pounds in June.

EXPAND FRENCH PROGRAM: Mutual Security Agency is recruiting a new team of ten American foundry specialists to work for a year on an expansion of managerial and technical assistance to the French foundry industry. Success of a productivity program, started about a year ago, prompted the French government and industry to pledge over 300 million francs to support an enlarged program. The French Foundry Syndicate, through the National Productivity Center, has requested MSA assistance in implementing the new effort. U. S. share of the cost will cover dollar salaries of the American team members, estimated at $180,000.

NONFERROUS DECORATIONS: NPA has dropped the restrictions on decorative use of copper and aluminum on consumer goods. This does not increase the amount of these materials a manufacturer may use, but permits him to divert his allotment from functional to decorative uses if he chooses.

CASTING PRICES: Producers of copper and copper-base castings have been authorized by OPS to increase their ceiling prices to reflect the higher cost of imported copper. Amount of increase is to be calculated at the beginning of each calendar month by multiplying the percentage of foreign copper actually used to produce castings the preceding month by 80 per cent of the cost of such foreign copper in excess of 24½ cents a pound, the domestic ceiling price. The extent and manner in which increases in other material costs and labor costs of all casting producers may be passed along is in process of formulation and is expected to be announced shortly.

PERSONALS: John F. Smith, general superintendent, Chevrolet Grey Iron Foundry, Saginaw, Mich., has succeeded Carl C. Wood, plant manager, retired . . . Franz T. Stone has resigned as deputy administrator of NPA to resume the presidency of Columbus McKinnon Chain Corp., Tonawanda, N. Y. . . . Sands G. Falk has been named manager of foundry and weldment sales, the Falk Corp., Milwaukee, following merger of the two sales divisions. He formerly was foundry sales

manager . . . George F. Pettinos Sr., president, George F. Pettinos Inc., Philadelphia, on Sept. 20 will celebrate his 90th birthday and 60th year as active head of the company he formed in 1892 .

INVENTORIES CUT: As forecast here last month, NPA has reduced permitted inventory limits on pig iron from a 60-day to a 30-day supply or practical minimum working inventory, whichever is less. Under "practical minimum working inventory" consumers may use any reasonable representative period in the six months ended June 30, 1950 to determine their inventory positions.

MANGANESE PRICE UP: Ceiling prices for ferromanganese and other manganese metallurgical products have been increased by OPS. Previously, ceilings were established under the General Ceiling Price Regulation. The new regulation, establishing definite schedules, means an average increase of about $40 a gross ton over previous ceilings.

SMALL PLANT LOANS: The RFC has approved 131 loan applications involving $15 million which were filed under Section 714 of the Defense Production Act, applicable to small plants. More than $300 million is involved in loan applications made to date, but the Small Defense Plants Administration has recommended favorably only 179, involving about $22 million, to the RFC.

MISCELLANY: Hagan Corp., Pittsburgh, combustion and chemical engineering equipment manufacturer, has purchased American Cast Products Inc., Orrville, O. . . . Army Ordnance Corps has acquired a plant at Pittsburg, Calif., to make tank castings. U. S. Steel's Columbia-Geneva Steel Division will operate it, and about $9½ million will be spent for plant rehabilitation and conversion . . . Price reductions averaging about 7 per cent have been announced by Electro Metallurgical Co. on all grades of 90 per cent ferrosilicon and silicon metal . . . Battelle Memorial Institute has broken ground for a new million-dollar "special purpose" laboratory building . . . The recent increase of 1 cent a pound granted by OPS in ceiling prices on aluminum pig and ingot applies only to primary aluminum, not to scrap or secondary ingot . . . Silverstein & Pinsof Inc., Chicago smelter and refiner, is changing its name to Sipi Metals Corp., effective Sept. 1 . . . The government has developed a new procedure permitting quick adjustment of wages by those companies who, in the past, have patterned their wage changes to those in the basic steel industry.

PRICES OF FOUNDRY METALS AND COKE

(As of Aug. 26, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$17.00-18.00
New River	20.80
Wise County	15.95

OVEN

Birmingham	$20.30
Chicago	23.00
Detroit	24.00
Erie, Pa.	23.50
Everett, Mass.	24.80
Indianapolis	22.75
Kearney, N. J.	22.75
Milwaukee	23.75
Painesville, O.	24.00
Philadelphia	22.70
Neville Island (Pittsburgh)	23.00
Portsmouth, O.	22.50
St. Louis (delivered)	25.40
Swedeland, Pa.	22.60
Terre Haute, Ind.	22.50

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$54.50	$55.00
Birmingham	48.88	....
Buffalo	52.50	53.00
Chicago	52.50	52.50
Cleveland	52.50	52.50
Everett, Mass.	57.50	58.00
Fontana, Calif.	58.50	....
Geneva, Utah	52.50	....
Granite City, Ill.	54.50	54.90
Lone Star, Tex.	48.50	48.50
Neville Island (Pittsburgh)	52.50	52.50
Steelton, Pa.	54.50	55.00
Swedeland, Pa.	56.50	57.00
Toledo, O.	52.50	52.50
Troy, N. Y.	54.50	55.00
Youngstown, O.	52.50	52.50

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 20.00c, Secondary No. 12 alloy 19.50c. Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 24.50c, Connecticut valley; Lake 24.61½c, delivered.

ZINC: High grade 15.35c, delivered. Die casting alloy 18.50c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

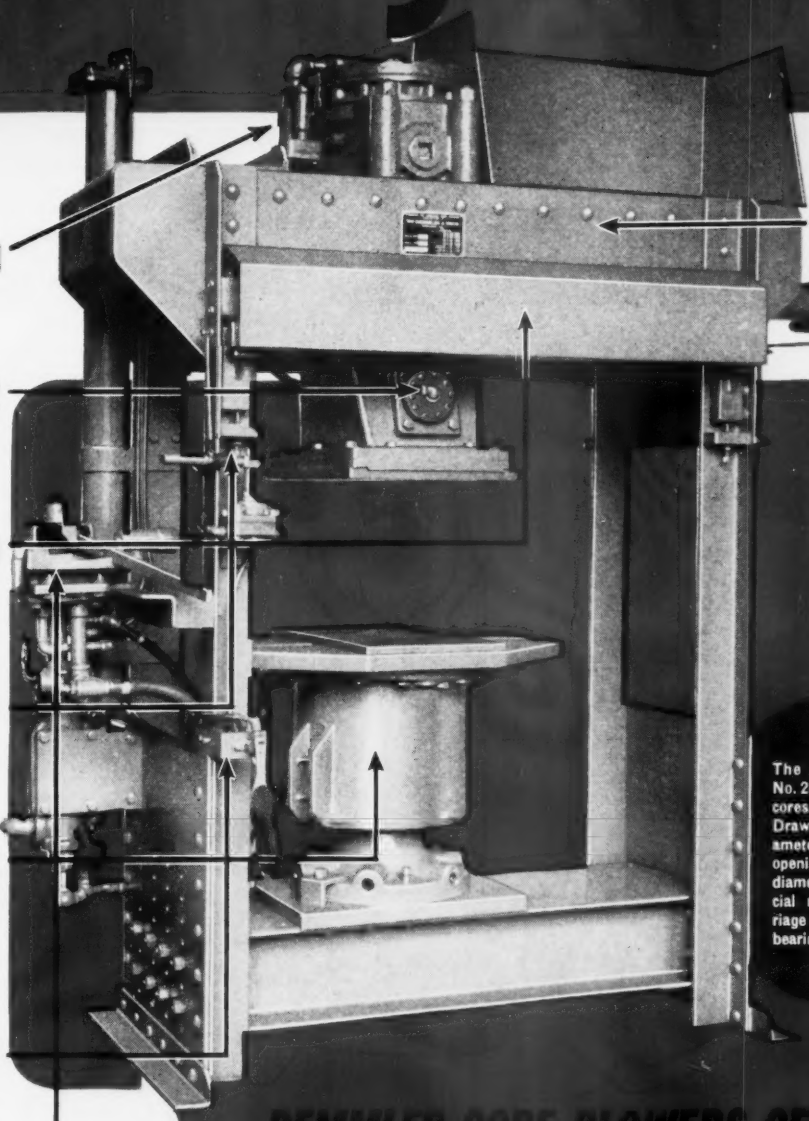
Above delivered prices are ceiling levels at basing points indicated. * Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

Better Eight Ways



1 Ultra high speed blow valve action — increasing initial blow pressure 25% above other machines.

2 Magazine exhaust valve – extra large size – quick acting – immediately exhausts air from magazine after core is blown.

3 Cross head rails – on outside of machine frame – out of sand area – where drawing accuracy would be impaired.

4 Leveling adjustment – 4 screw adjustment for complete adjustment of core box to draw–EASILY ACCESSIBLE.

5 Completely enclosed drawing post – drawing accuracy within thousandths – protected from sand and abrasion – assuring long, trouble-free life.

6 2 speed hydraulic draw control – low speed while vibrator is acting and quick drop after core is drawn.

7 Hard, chrome plated valve seats – to insure against rust and deterioration.

8 All parts of machine easily accessible for low maintenance costs.

The popular DEMMLER No. 2E Core Blower handles cores weighing up to 20 lbs. Draw cylinder is 14" in diameter, 10" stroke. Throat opening in carriage is 7" in diameter. Standard or special magazine sizes. Carriage is equipped with ball bearings.

DEMMLER CORE BLOWERS OFFER EVERY IMPORTANT DESIGN ADVANTAGE . . .

DEMMLER Core Blowers — and only DEMMLER Core Blowers — offer you all eight of the important design features by which core blower value is determined. Here's a check list of DEMMLER features. Compare them with those offered by any other core blower — then you be the final judge of values!

*Remember, every DEMMLER Core Blower possesses outstanding features. Little wonder that DEMMLER Core Blowers are often copied—never equalled!

Wm. DEMMLER & BROS., Kewanee, Illinois

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

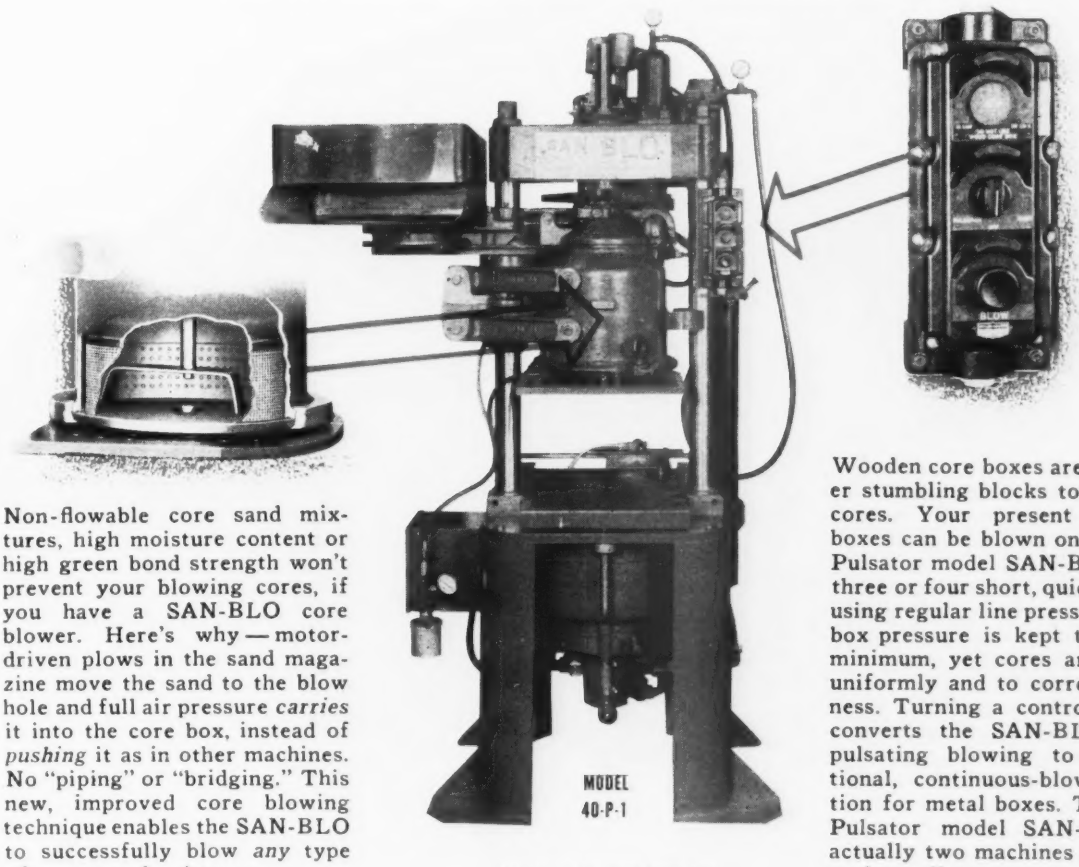
speed plus dependability

PROBLEM...

How can we blow a greater percentage of our core boxes?

SOLUTION...

With the new Pulsator model SAN-BLO you can blow wooden as well as metal core boxes and you can blow any core sand mixture you've been hand-ramming



Non-flowable core sand mixtures, high moisture content or high green bond strength won't prevent your blowing cores, if you have a SAN-BLO core blower. Here's why — motor-driven plows in the sand magazine move the sand to the blow hole and full air pressure *carries* it into the core box, instead of *pushing* it as in other machines. No "piping" or "bridging." This new, improved core blowing technique enables the SAN-BLO to successfully blow *any* type of core sand mixture you can hand-ram.

Write, wire or phone for complete information.

Wooden core boxes are no longer stumbling blocks to blowing cores. Your present wooden boxes can be blown on the new Pulsator model SAN-BLO with three or four short, quick blows, using regular line pressure. Core box pressure is kept to a safe minimum, yet cores are blown uniformly and to correct hardness. Turning a control switch converts the SAN-BLO from pulsating blowing to conventional, continuous-blow operation for metal boxes. Thus, the Pulsator model SAN-BLO is actually two machines in one—truly an all-purpose core blower.

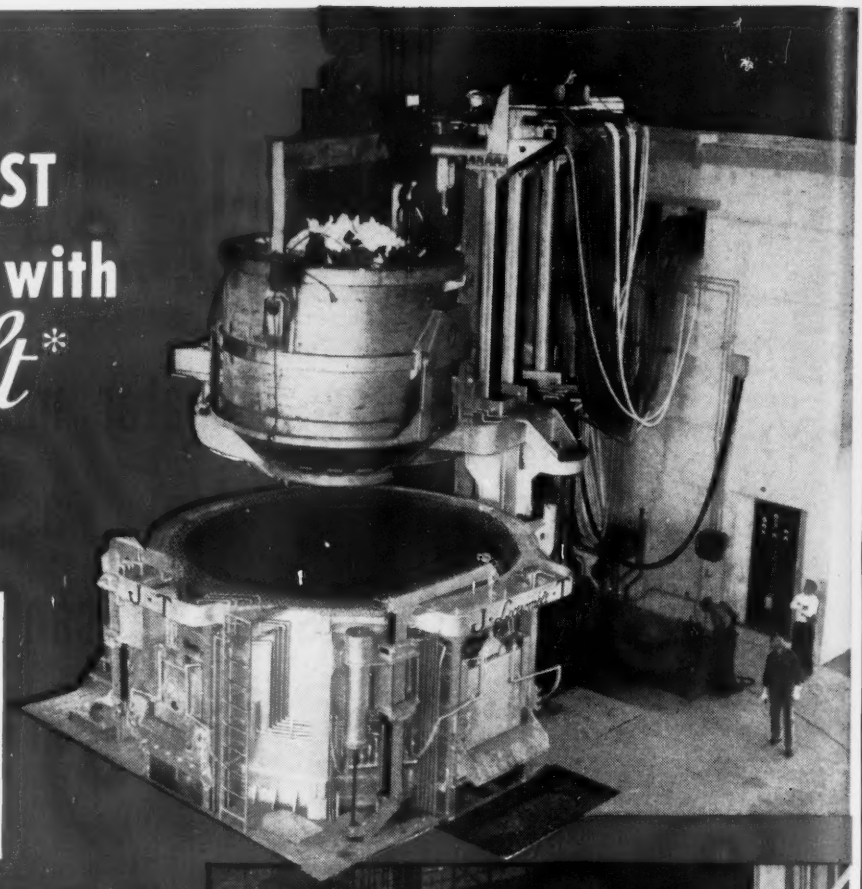
The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

SALES OFFICES: NEW YORK · CLEVELAND · DETROIT · MILWAUKEE · LOS ANGELES

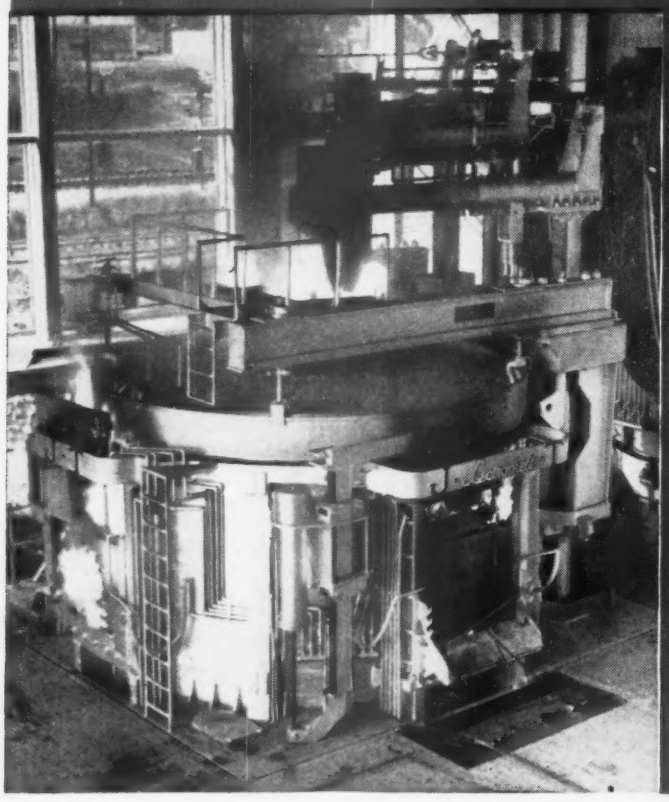
FEDERAL

WORK GOES FAST and SMOOTHLY with *Lectromelt** FURNACES



Right: Labor-saving top charging lets a Lectromelt Furnace get to work *fast*.

Below: With a Lectromelt Furnace, you can crowd on the power while holding close control on quality.



Lectromelt's hydraulic tilting mechanism provides positive, easily controlled, trouble-free operation. For Catalog No. 8 giving more details, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pa.

TWENTY FIVE POUNDS TO

ONE HUNDRED FIFTY TONS CAPACITY

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

*Reg. T. M.

Cut Core Costs These 14 Ways

See how Allis-Chalmers revolutionary system of drying sand cores dielectrically lowers foundry costs and improves your product.

1. Rapid baking — Takes but a few minutes; provides more production per unit of floor space.
2. Complete baking at lower temperature—means easier handling—less heat in core room—less fuel used.
3. No burning, no overbaking — It's impossible to overbake edges or thin sections.
4. Low core scrap! Cores are hard and dry the minute they come out of the oven. This reduces breakage in handling.
5. Minimum core storage space — Cores can be made up as needed . . . no need to build up stock.
6. Excellent shakeout characteristics.
7. Lower casting rejects — Cores are *completely* cured.
8. Cores usable at once — No cooling required. Core making can be placed right in casting production set-up.
9. Good collapsibility.
10. No oven warm-up — Unit is ready to go at once. Saves fuel.
11. Good dimensional stability in cores.
12. Smoke and fumes minimized.
13. Smoother casting surface.
14. Cost of oven operation is low.

Get complete details on the *Foundromatic* Sand Core Dryer. Call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wis.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

QUESTIONS and ANSWERS

About Dielectric Sand Core Drying

Do I need an electronic engineer to help me?

No. Once equipment is installed and operating, any personnel can be quickly trained to follow operating instructions.

How much maintenance is there?

Very little. Periodic oiling of conveyor and blower motors and rollers and replacement of tubes.

Why are resin binders used in place of core oils?

Core oils require high temperatures and long drying time for complete polymerization. Resin binders cure at lower temperatures . . . approximately 250 F.

What about collapsibility?

Resin bonded cores have very good collapsibility, contributing to a faster, cleaner shakeout.

I want a very hard core, but still want good collapsibility. What do I do?

Spray the cores with a film of moisture just before putting them on conveyor belt. This will give high surface hardness without affecting collapsibility.

Can core rods or nails be used?

Yes. When rods or nails are parallel to electrodes no trouble is encountered. When rods or nails are placed vertically in the core they should be of minimum size in relation to core mass and should not protrude through surface of sand.

Will light sections burn if dried with heavy sections?

No. Cores will not burn in the *Foundromatic* core dryer.

SEND

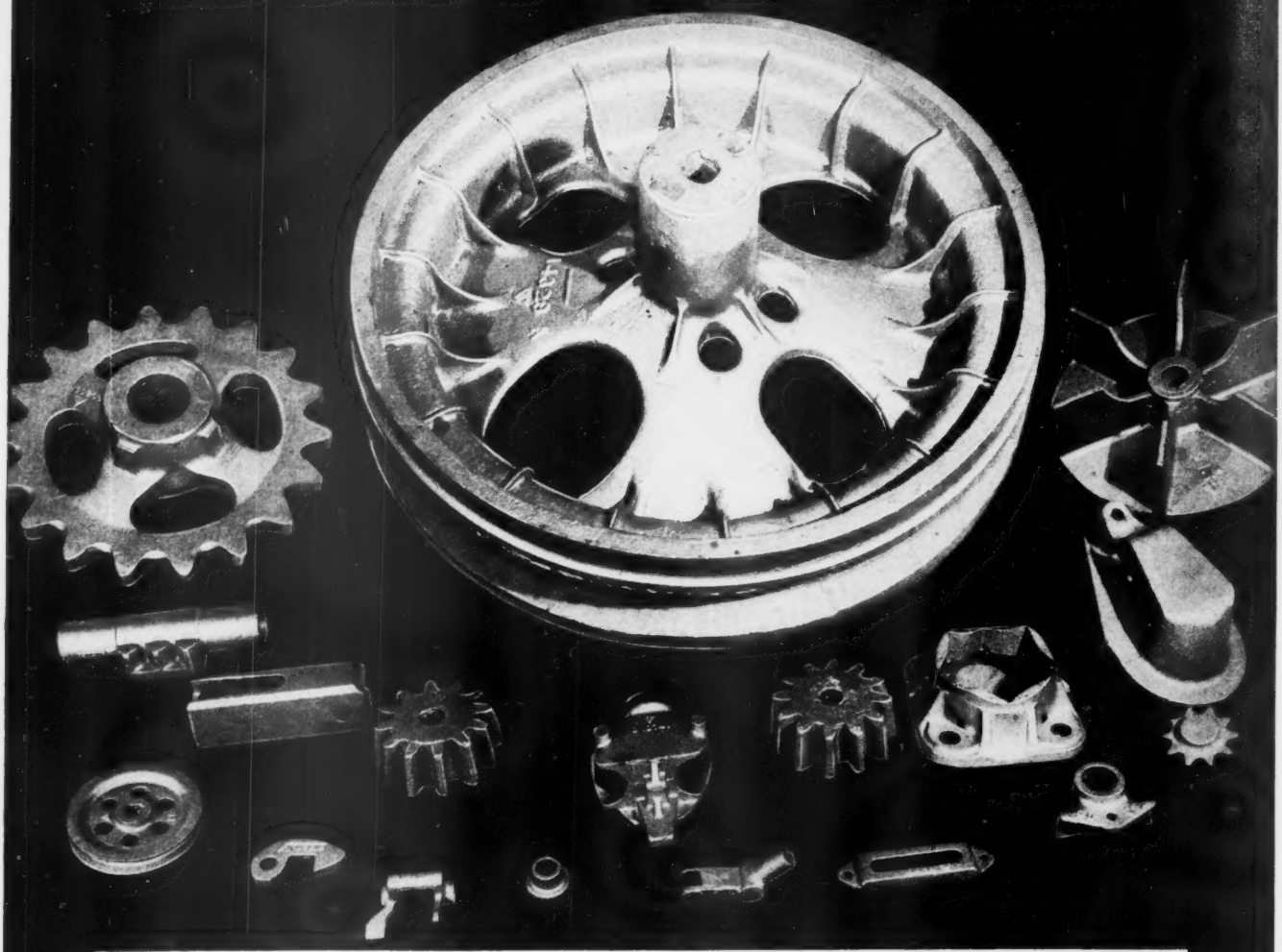
Allis-Chalmers
Milwaukee 1, Wisconsin

Please send me new 8-page booklet 15B7306B containing complete information on the *Foundromatic* sand core dryer.

Name .....
Title .....
Company .....
Street .....
City ..... State A-3850

RIGHT

FOR ALL FACING SANDS
FOR ALL MOLDING METHODS
FOR ALL SIZE CASTINGS



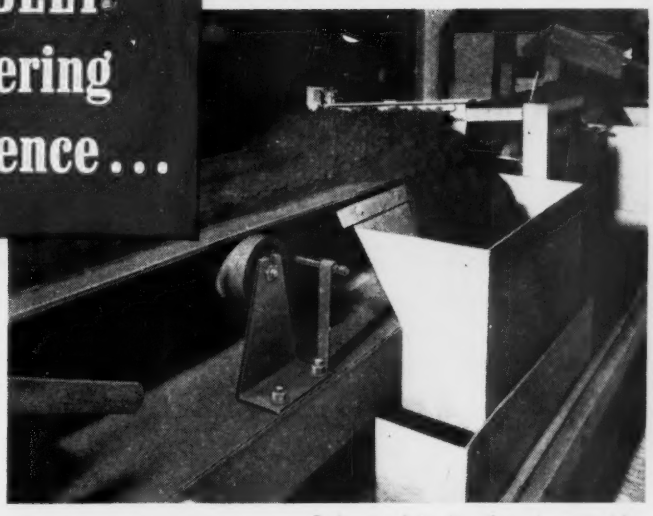
The castings pictured here weigh from a fraction of a pound to 1750 pounds. They were produced by squeezer, jolt, and loose pattern molding methods. This unretouched photograph tells the versatile story of Hercules NVX at a glance. It proves beyond question that NVX in facing sands results in better castings—regardless of the method of molding. If you want better sand flowability for firmer, denser molds and clean, deep draws—you need NVX. We'll be glad to send you 100 lbs. of NVX for testing. Price per pound of this testing sample will be at the rate we usually quote if you were ordering in 1,000 lb. lots.

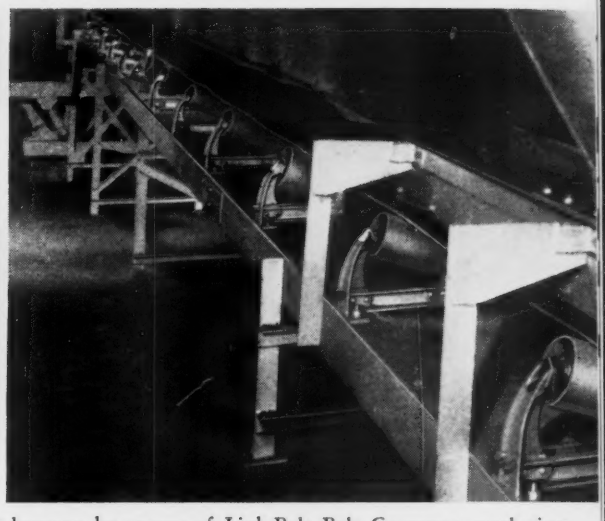
HERCULES POWDER COMPANY
INCORPORATED
Naval Stores Dept., 920 King St., Wilmington 99, Del.

NF52-4

HERCULES®
NVX

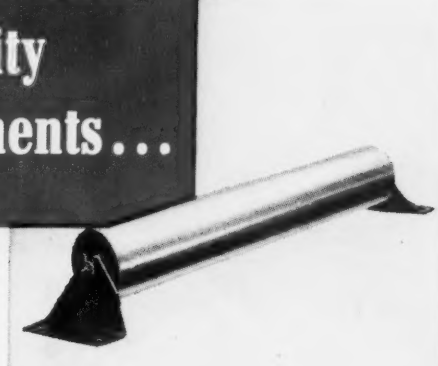
LINK-BELT engineering experience...



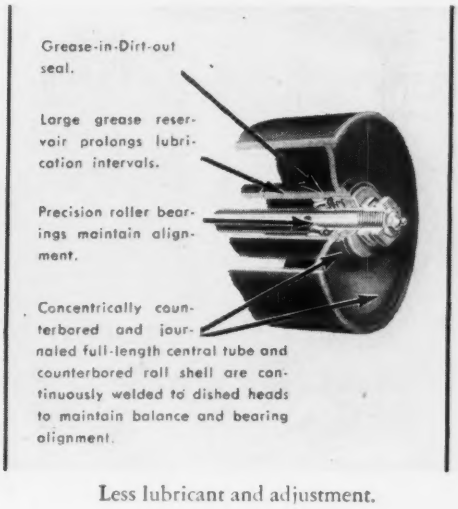


Left: Sand is distributed to molders' hoppers by means of Link-Belt Belt Conveyor employing flat roll idlers. *Right:* Spill-sand is carried on troughed conveyor in tunnel under line of molding machines.

plus LINK-BELT quality components...



Roller bearing L-B Flat Belt Idler.


Grease-in-Dirt-out seal.
Large grease reservoir prolongs lubrication intervals.
Precision roller bearings maintain alignment.
Concentrically counterbored and journaled full-length central tube and counterbored roll shell are continuously welded to dished heads to maintain balance and bearing alignment.

Less lubricant and adjustment.

No springs, no loose parts, no sliding metal-to-metal contact.
Foreign matter can't penetrate labyrinth—lubricant preserved.

Grease-in-Dirt-out Seal.

add up to your best buy in BELT CONVEYORS

In foundries all over the world, LINK-BELT Belt Conveyors provide reliable, efficient sand handling

OBTAIN the finest in modern sand handling in your foundry. It can be as simple as calling in a Link-Belt foundry specialist while you're still in the planning stage.

Thousands agree Link-Belt builds the finest belt conveyors on the market today. And it has the most complete line of components—all types and sizes of idlers, take-ups, pulleys, plows, bearings and power transmission drives—plus related equipment, including trolley, oscillating and mold conveyors, shakeouts and other sand handling machinery.

Equally important, Link-Belt foundry specialists draw on the broadest background in the industry. They'll work with you and your consultants — help you come up with the right layout for your requirements.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities. 12,528

LINK-BELT

CONVEYORS and PREPARATION MACHINERY

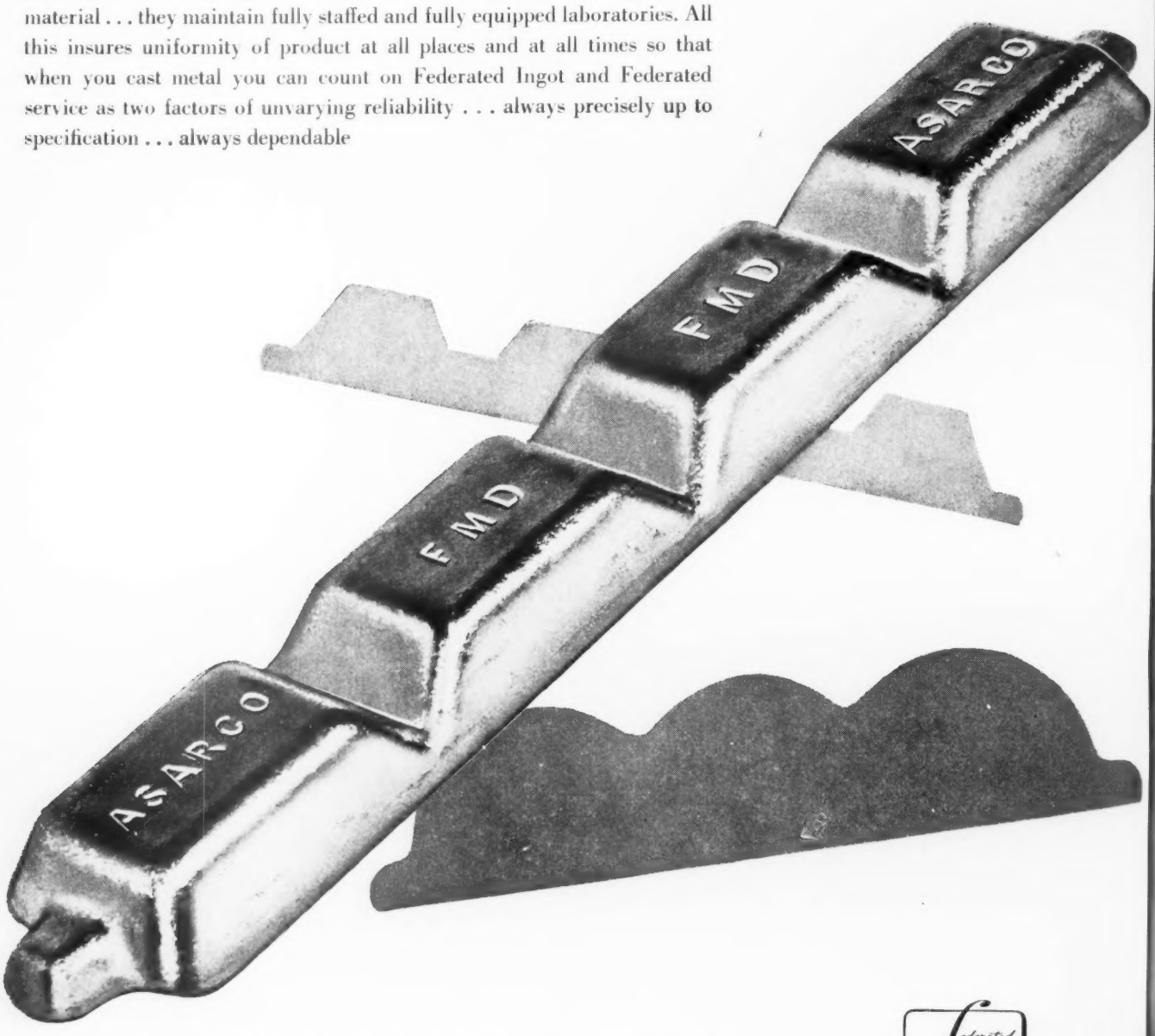
What Makes ONE Aluminum Ingot Better For You Than Any Other?

Federated's nation-wide acquaintance with the problems *you* meet in *your* foundry makes Federated Ingot the best for you to buy.

If you have a casting problem you can be sure . . . somewhere, sometime . . . a friendly Federated service man has helped a foundryman solve *that* problem.

The solution is in the records...the knowledge is in the hands of Federated service men . . . the service men are available when you need them.

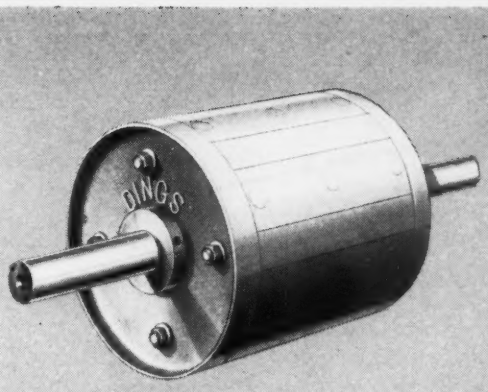
Call Federated first when you have a casting problem! Federated's resources are available to you, whether you employ a thousand men or do all the work yourself. They command the skill of nationally recognized technicians . . . they tap varied and widespread sources of every needed material . . . they maintain fully staffed and fully equipped laboratories. All this insures uniformity of product at all places and at all times so that when you cast metal you can count on Federated Ingot and Federated service as two factors of unvarying reliability . . . always precisely up to specification . . . always dependable



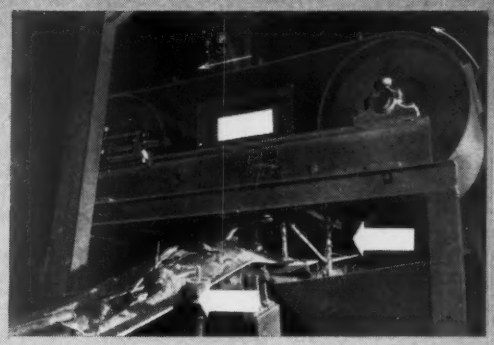
Federated Metals Division

Federated first in the non-ferrous field FMD

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.



Dings Non-electric, Permanent Perma-Pulley.



Dings Extra Powerful Self Cleaning Rectangular.

1. 2. 3. 4.

Dings All-Welded Cooler Operating Lifting Magnet.

Dings "Holdtite" holds castings in position for swing grinding.

4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . . *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

3. LIFTING MAGNET LIFTS 10 TO 100% MORE. Ideal for handling scrap, pig iron, castings, metal flasks, etc. Lifts more because it's cooler operating. All welded, lightweight, moisture-proof, rugged, 4-point chain suspension.

4. "HOLD-TITE" CUTS GRINDING LABOR COSTS UP TO 25%. Firmly holds all shapes of castings up to 1000 lbs. in position for swing grinding. Magnet can be tilted to 7 different positions. Requires practically no maintenance, simple to install. SEND FOR THIS PAPER: *"Lowering Cleaning Room Costs Through Use of Magnetic Chucks"*. Use coupon below.

If you can use the advantages these magnets offer, NOW is the time to act. Deliveries are still better than average.

Dings

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wisconsin

SEND THIS COUPON
OR DROP A POSTCARD

Dings: Send me Catalog containing full information on

☐ PERMA-PULLEY ☐ LIFTING MAGNET
☐ RECTANGULAR ☐ "HOLD-TITE" plus

Article on "Lowering cleaning room costs through the use of magnetic chucks"

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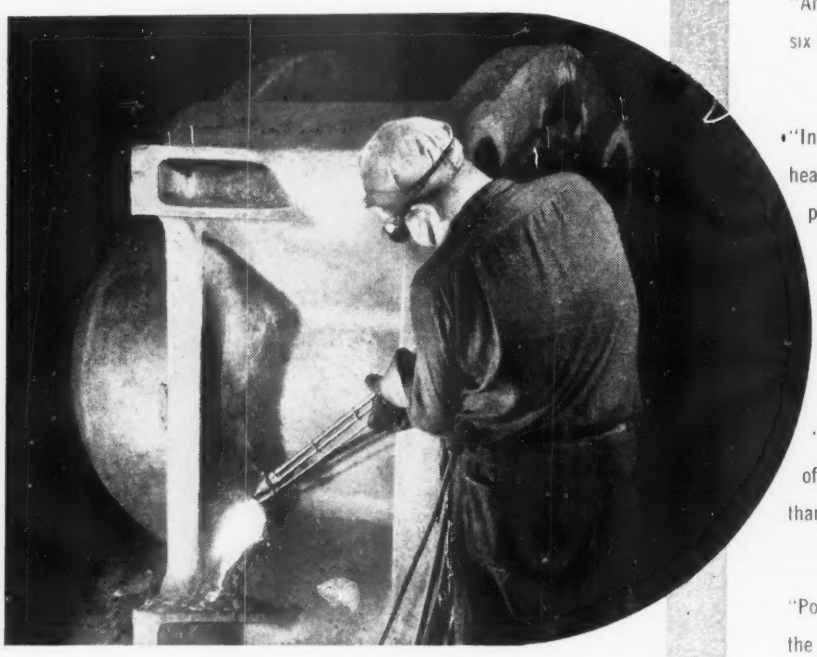
POWDER-WASHING SPEEDS CLEAN-UP

Removes excess and defective metal quickly, easily, and at low cost



Cleaning-floor bottlenecks eliminated, production up, costs down, scraps and recasts negligible—that's the gist of enthusiastic reports on LINDE's powder-washing process.

Powder-washing combines the quiet speed of oxygen-cutting with a surface quality comparable to finish grinding. It removes fins, pads, sand inclusions, penetrations, burned core sand, chill bars, nails, chaplets, cracks and tears. It finishes flat or uneven surfaces to close tolerances with equal ease. And the powder-washing flame gets into places where other equipment can't.

Powder-washing can be applied to any carbon or alloy-steel casting. Equipment is simple. Technique is easily mastered in a short time.

For further details, telephone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Dominion Oxygen Company, Limited, Toronto.

WHAT DO FOUNDRYMEN SAY ABOUT POWDER-WASHING?

". . . powder-washing does for us in two hours what required one day of chipping."

*

"An hour of powder-washing has replaced four to six hours of grinding."

*

"Increased production and reduced labor and overhead more than make up for the cost of gases and powder consumed."

*

". . . the equivalent of four days' chipping in one and one-half hours."

*

". . . a casting which formerly required one hour of grinding is cleaned by powder-washing in less than five minutes."

*

"Powder-washing cleaned one casting in an hour, the other in 30 minutes. Conditioning by chipping and grinding would have taken three and two days respectively."

*

". . . removed the shifted cores and penetrations with a saving of several hundred man hours."

*

". . . in a few hours, cleaned up housings that otherwise would have had to be scrapped."

*

". . . washed out a layer of sand from inside the cylinder in less than two hours, a job we could have done with no other available equipment."

LOOK TO *Linde* Trade-Mark know-how . . . show-how . . . products and processes FOR WELDING, CUTTING, TREATING, FORMING METALS

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

SPEED UP GATE REMOVAL with DoALL FRICTION SAWING!

THE speed of DoALL Zephyr Band Machines for removing gates, risers, flash and other superfluous material from castings will surprise you. DoALL Zephyr Band Machines are fast: they have actually saved as much as 90% in time and tool costs, depending on the thickness of the work. With DoALL you are able to get into complicated spaces and cut *close* to the casting and as finish is generally of high quality, grinding can be either eliminated or materially reduced. The cut is made fast enough so as not to allow heat penetration into the side wall of the finished cut and skin hardness never exceeds .003" deep. Zephyr Friction Sawing means low tool cost and greater tool safety for the operator.

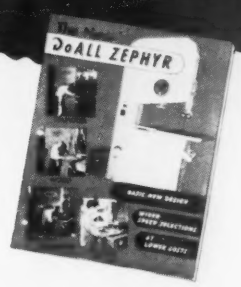
Where extremely fine tolerance and optimum efficiency is desired, automatic hydraulic feeding tables are available. There is a size DoALL Zephyr for every pocketbook and for almost every problem. If you have a special problem we will cooperate with you in tailoring saw design to solve it. Here are advantages you should look into. Ask for a free demonstration in your own plant. Call our local DoALL Sales Service Store or write.

THE DoALL COMPANY, 254 N. Laurel Ave., Des Plaines, Ill.

Above: Here is a DoALL Zephyr in a typical installation removing dead metal.

Below: With DoALL Friction Sawing you can cut close to the live metal and reach the hard-to-get-at places.

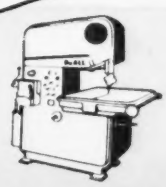
SEND FOR CATALOG



There is quite a story on costs and speeds in handling castings of various thicknesses. Ask for complete details with a catalog on DoALL Modern Band Machines.

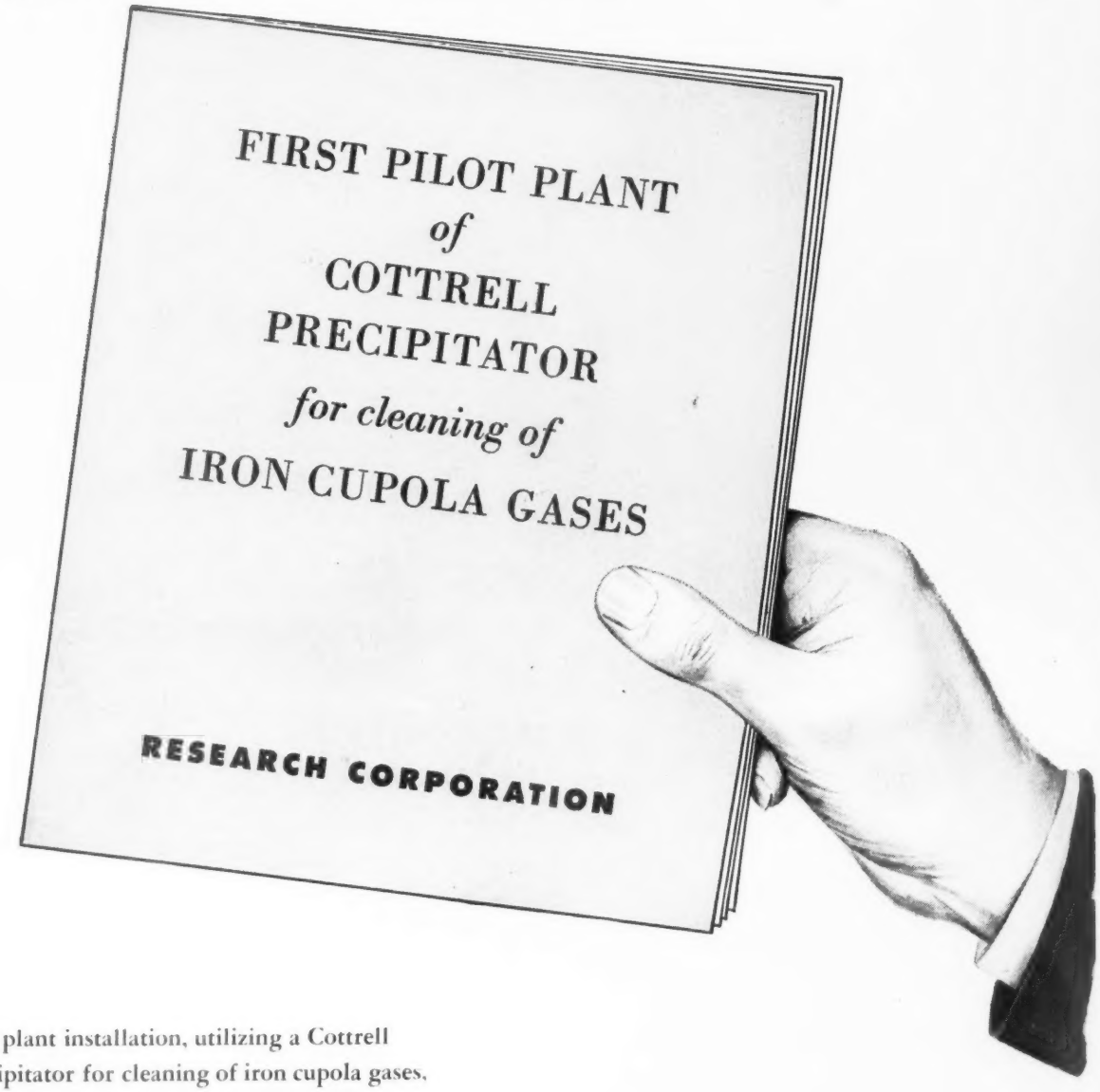
BMF-1

DoALL



Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

News on a New Process



The first pilot plant installation, utilizing a Cottrell Electrical Precipitator for cleaning of iron cupola gases, had resulted in detailed findings of industry-wide importance. On the basis of facts unearthed about cupola operation and the study of the design factors involved in this project, foundries have already placed orders for 15 precipitators with Research Corporation.

Ask your Research Corporation representative to go over the findings of this first pilot plant installation with you. His recommendation on your specific problem is based on 39 years of experience in the design and erection of over a thousand Cottrell Electrical Precipitators.

RESEARCH CORPORATION

405 Lexington Avenue
New York, New York

122 South Michigan Avenue
Chicago 3, Illinois

Bound Brook, New Jersey

RC-133

HIGHEST QUALITY CASTINGS ARE ANNEALED IN 48 HOURS BY THIS LARGE ELEVATOR FURNACE, ONE OF TWELVE AT THIS PLANT.

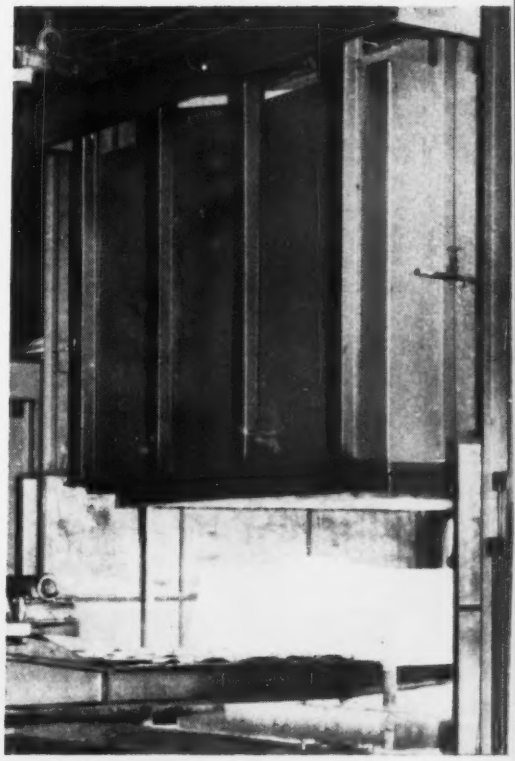
THREE MALLEABLE FOUNDRIES SAVE TIME, CUT COSTS WITH G-E ELECTRIC FURNACES

Like these three plants, you may find you can drastically cut annealing time, reduce over-all costs and produce better, more uniformly annealed malleable iron by installing G-E electric furnaces.

Have a cost study made on your plant by an experienced G-E Heating Specialist, as these foundries did. His findings, based on experience with many similar applications, will offer proof that a G-E electric furnace will give you the greatest long-range return for your capital investment.

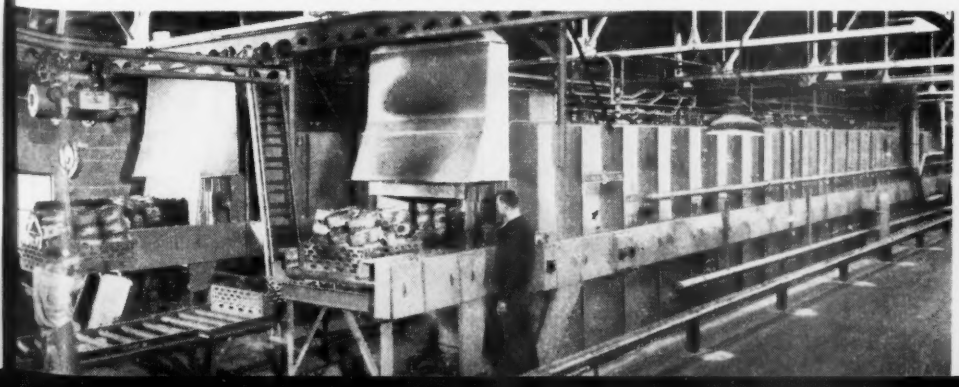
You can select all your heat-treating equipment from G.E.'s complete line of electric furnaces, atmosphere equipment and handling equipment for nearly every heat-treating process. Start your plant planning by contacting the nearby G-E Sales Office for the recommendations of an Industrial Heating Specialist. Or write Sect. 720-80, *General Electric Co., Schenectady, New York.*

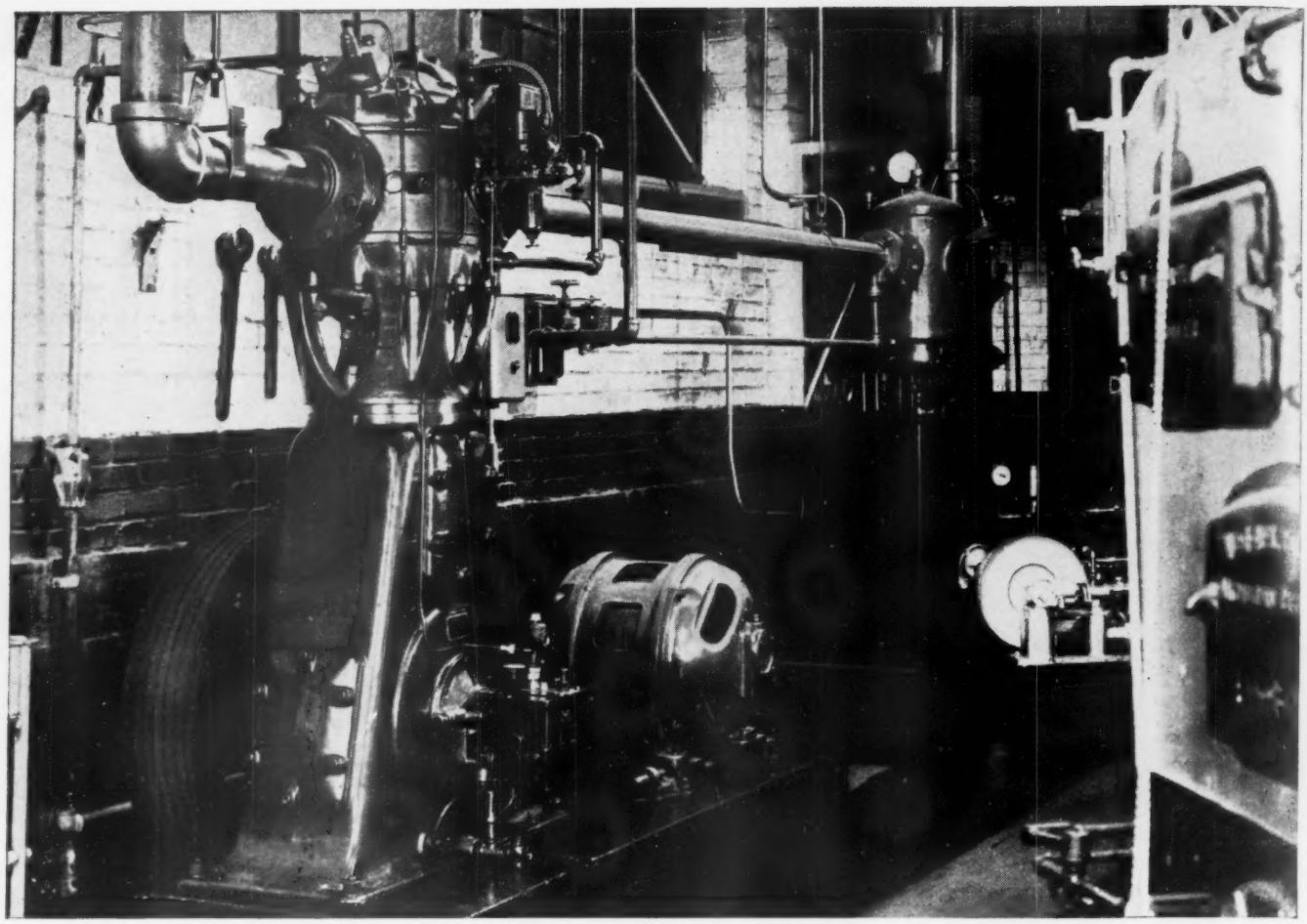
GENERAL ELECTRIC



ANNEALING TIME WAS CUT from 6 days to 48 hours here by using G-E bell-type furnaces. Electric heat produces better-annealed castings at a lower unit cost.

26 TO 30 NET TONS of castings are annealed daily by this roller-hearth furnace on a 21-hour cycle. Automatic heating cycle control gives very high-quality, uniform castings.



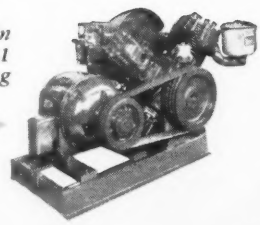


SAVE VALUABLE SPACE WITH THE EFFICIENT

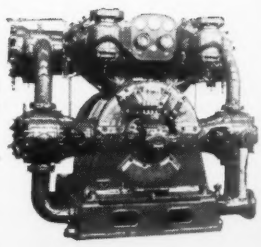
JOY WG-9 HEAVY DUTY AIR COMPRESSOR

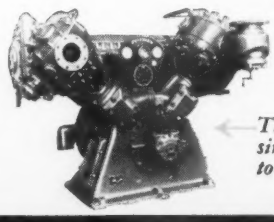
The JOY WG-9 Vertical, with its small base, saves valuable floor space. Built in a range of sizes to 881 CFM, for continuous heavy-duty service. The complete line of JOY stationary units—high and low pressure compressors, oil-free compressors, boosters and vacuum pumps—includes a type for every need, each incorporating exclusive features developed by JOY research. Supplementary products include the only complete line of vaneaxial fans and blowers, and the new JOY Oxygen Generator. ● *Write for free Bulletins.*

The JOY WL-80, in eleven sizes up to 641 CFM, with operating pressures to 125 psi.



The JOY WN-114, in single or twin units up to 7312 CFM.





The JOY WN-112, in single or twin units up to 3656 CFM.

Consult a Joy Engineer

W&D 13786

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Desand-degraphitize castings in 10 minutes with VIRGO® MOLTEN CLEANER

UNLOADING VIRGO-CLEANED CASTINGS from continuous cleaning line.

HERE ARE THE BENEFITS!

- **Longer machine tool life.**
- **All surface defects show up.**
- **A cleaner, better product.**

With Virgo Molten Cleaner your castings are completely free from sand and graphite before they are machined, giving you greater machine tool life. Any surface defects on castings are shown up, and you can scrap defective castings before they are machined. This same freedom from impurities insures trouble-free operation for your product when it is placed in use.

The process is simple and easy to operate—does not require close supervision. A five-minute immersion of castings in Virgo Molten Cleaner bath at 800° F. is usually enough to dissolve every trace of sand, and dissolve graphite to satisfactory depth. A water quench removes salt and leaves a protective coating on the castings. (This coating is corrosion-resistant and may be left on if castings are to be stored.) The coating is removed by a three-minute dip in dilute acid. A brief water hosing or rinse completes the job.

You can use the Virgo bath, at higher temperature, to stress relieve while desanding. By combining operations in this way, costly annealing equipment, as well as the additional operation can be eliminated.

For full details and description of this process, write us today. Please use your business letterhead or coupon below.

For Fast, Safe, Low-Cost DESCALING— VIRGO® DESCALING SALT

Producers and fabricators of stainless and alloy steels use Virgo Descaling Salt to quickly remove scale produced by hot rolling, forging, extruding, casting, annealing. The Hooker Process is backed by 15 years' experience in salt bath descaling and cleaning. Engineering, research and on-site operating assistance are part of our service.

SEND FOR THESE BULLETINS

They tell the whole story on Virgo Descaling Salt and Virgo Molten Cleaner—what they are, how they work, their advantages, equipment involved, and the Hooker services you enjoy as a user of the process.

Hooker Electrochemical Company
20 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

Please send me Bulletins checked: Virgo Descaling Salt ☐ Virgo Molten Cleaner ☐

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE ____ STATE ____

HOOKER CHEMICALS ®

From the Salt of the Earth

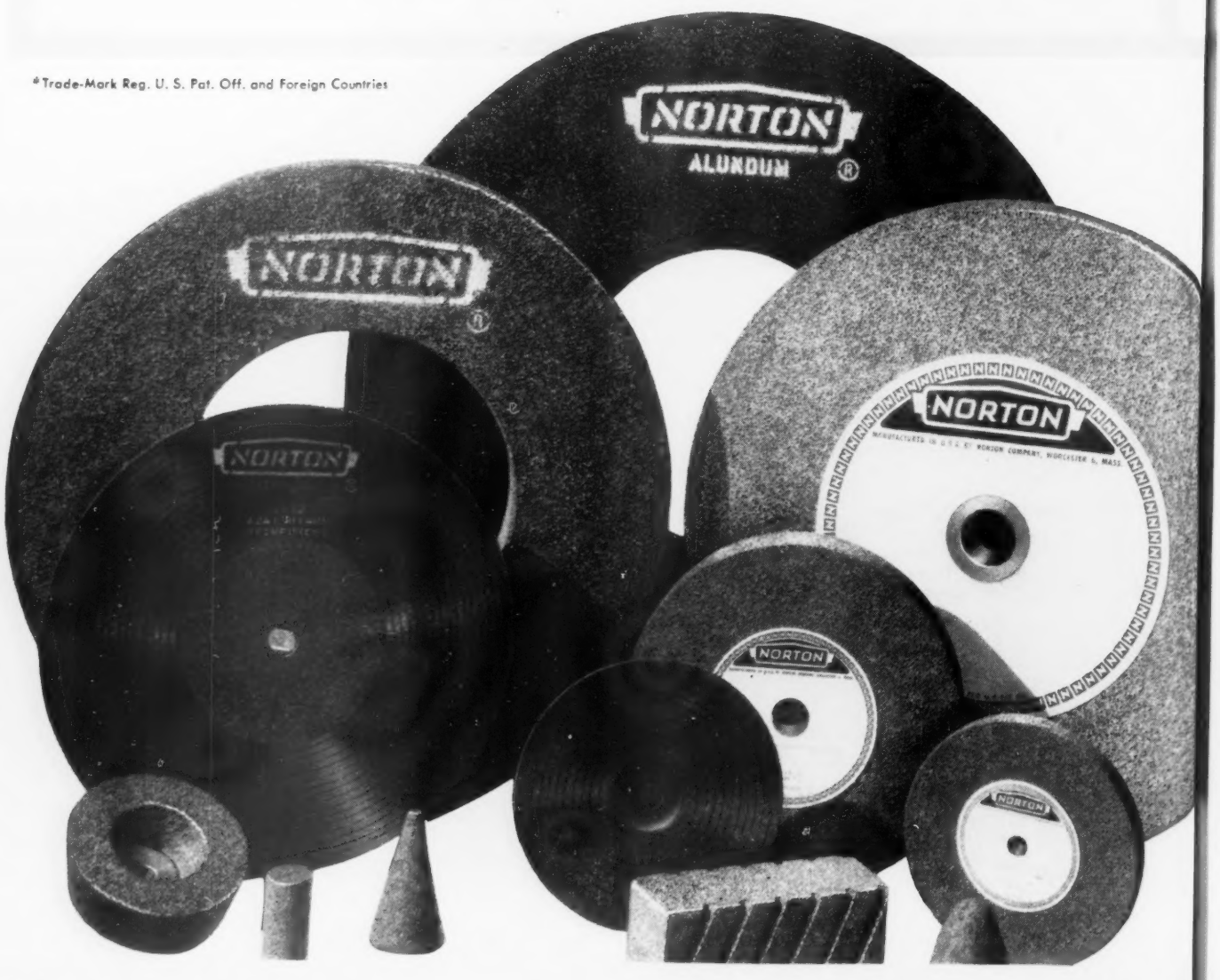
HOOKER ELECTROCHEMICAL COMPANY

20 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y.
WILMINGTON, CALIF.
TACOMA, WASH.

1-1949

Here's why Norton CRYSTOLON* wheels are *all-around cost cutters* in gray iron foundries

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



Slow speed grinding on gray iron fly wheels, using a vitrified bonded CRYSTOLON wheel.

Cleaning a gray iron transmission case with a CRYSTOLON resinoid bonded wheel on a high speed floor stand.

Broad surfaces on large castings like this cylinder block are quickly cleaned with high-speed resinoid bonded CRYSTOLON wheel on swing grinders.

Cleaning a gray iron casting with a CRYSTOLON wheel on an air grinder.

First in Norton CRYSTOLON wheels you get an abrasive with just the right hardness and sharpness for fast, economical grinding on a low-tensile-strength material like gray iron.

Second there's a CRYSTOLON wheel that's exactly right for every cleaning room job you do. That goes for everything from swing grinder work to bench stand — for heavy or light grinding pressure, large or small contact areas, high or low speeds.

Third you can depend on CRYSTOLON wheels for consistent top performance — thanks to Norton's method of controlling grain spacing that assures uniform structure within wheels and from wheel to wheel.

PROFITABLE WHEEL PERFORMANCE
is not simply a matter of wheel *cost* or wheel *life*.

You've got to consider *total* grinding costs including labor and overhead.

For example, a relatively soft wheel can be more economical to use than a harder one. That's because the hard wheels, although having longer life, tend to have slower cutting action. So it's possible to save money on the number of wheels used while spending even more on labor and overhead costs. CRYSTOLON wheels, expertly engineered, will do the job at minimum total cost.

YOUR NORTON DISTRIBUTOR CAN HELP YOU

To supplement his own practical experience in grinding applications, your Norton Distributor can always call in a Norton Abrasive Engineer on special jobs. They will be glad to study your grinding jobs, help you decide what wheels will give you the lowest grinding cost. Remember: both your Norton Distributor and Abrasive Engineer are backed by the long, pioneering leadership of the world's largest manufacturers of abrasives.

GET THIS FACT-FILLED BOOKLET

Norton's 54-page, illustrated booklet gives you a lot of money-saving tips on the grinding jobs you're doing right now. Ask your Norton Distributor for Booklet 1405, or write us direct. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES

Making better products to make other products better

Fremont MAGNESIUM FLASKS

The Way to

MORE EXACTING WORK

Accurately machined inside surfaces and flanges. Steel faced top and bottom flanges.

LONGER SERVICE

Magnesium has twice the tensile strength of aluminum.

EASIER HANDLING

Magnesium weighs 1/3 less than aluminum.

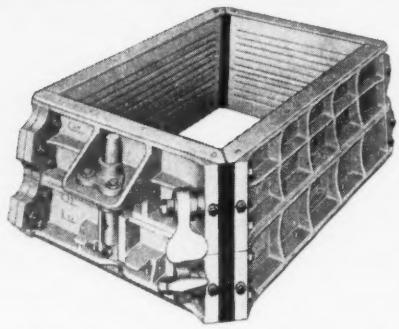
All orders given prompt attention. Write today for literature.

THE FREMONT FLASK CO.

FREMONT, OHIO

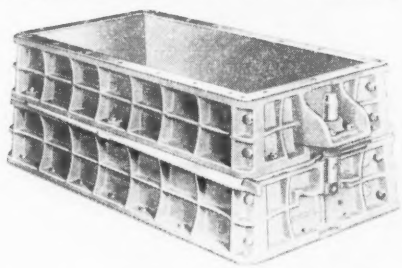
The New

FREMONT SPREADLOCK FLASK



Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps so that no sand can lodge in the open corners.

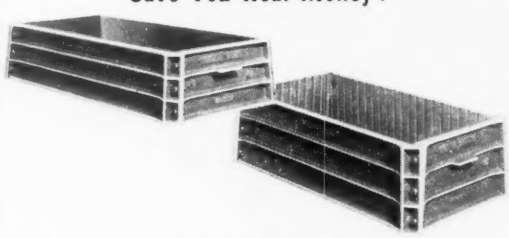
FREMONT STANDARD SLIP FLASK



The one-inch **GROOV-LOCK FOOLPROOF PIN**, particularly adapted to cope or drag pattern jobs, guarantees perfect alignment indefinitely. (Other types of standard pin fittings available.) Solid, bolted and welded corner construction.

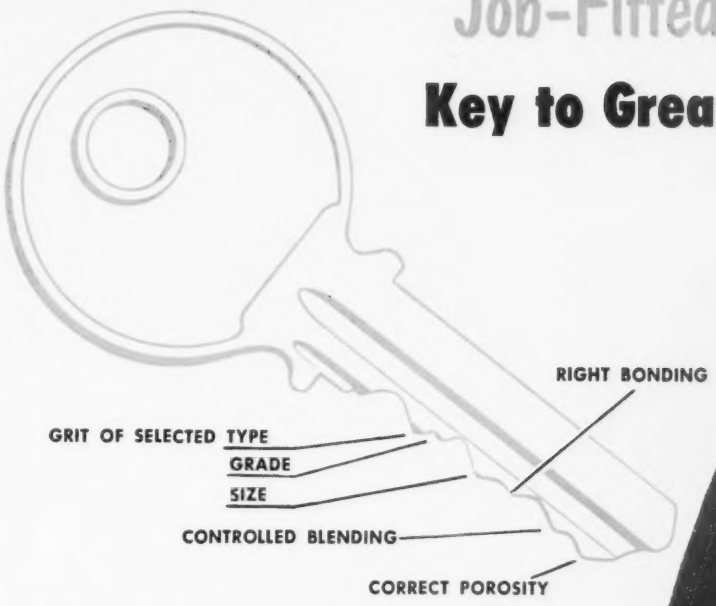
FREMONT CAST IRON OR CAST ALUMINUM JACKETS

Save You Real Money!



Precision machined and drilled, bolted corner construction permits easy insertion of new sides or ends. The entire jacket need not be scrapped. Standard style for ordinary foundry practice. Grooved style, which permits ready gas escape, for steel foundries. Glass and jackets can be assembled on 3°, 4°, or 5° taper.

WHY BESLY-TITAN "Job-Fitted" WHEELS are the Key to Greater Grinding Efficiency



Here's the master key to top efficiency in grinding operations: *Besly-Titan is set up to supply the right wheel for each job,* as you need it, when you want it, at no higher cost than stock wheels!

As the tumblers in a lock yield to just one key, only one set of specifications in the grinding wheel will get *best* results on a casting, with its own set of unique qualities. It is the differences in iron or alloy, the size and shape of casting, quantity of stock removed, type of grinder, results wanted from grinding, etc., that prevent one "key" from fitting job after job. Changed specifications in the work call for changed specifications in the wheel used.

This is why the "job-fitting" service you get with Besly-Titan Abrasive Wheels and Discs makes them the outstanding buy for foundries.

Besly-Titan is organized to diagnose your needs, prescribe the wheel that will perform best on a given job, and supply you on a few-days-delivery schedule. Use the coupon below, or write, to secure all details on formula recommendations and Trial Order Plan.

BESLY-WELLES CORPORATION

(Established as Charles H. Besly & Co. in 1875)

20 No. Wacker Drive • Chicago 6, Illinois

Representatives in principal cities

BESLY-TITAN

BESLY-WELLES CORP., Dept. F, 20 No. Wacker Dr., Chicago 6, Ill.
(Established as Charles H. Besly & Co. in 1875)

☐ Please send details of Besly-Titan "Job-Fitted" Wheel Service.

☐ Also tell about Trial Order Plan.

*Name*_____

*Foundry*_____

*Address*_____

*City*_____ *Zone*___ *State*_____

"We cut fuel costs in half!"

CONTROL DATA		
LINING	**MAX. FUEL CONSUMPTION**	**CONTROL**
Ordinary Firebrick	**1,000,000 BTU/HR**	**100 to 150F Overshoot of Critical Pouring Temp.**
B&W Insulating Firebrick	**500,000 BTU/HR**	**No Overshoot of Critical Pouring Temp.**

THE CHART ABOVE shows how B&W Insulating Firebrick slashed fuel bills by 50% and provided close temperature control when it was used in place of ordinary firebrick in a crucible type furnace melting magnesium. Similar savings were also made on identical units melting aluminum. • The reason for this superior performance is that lightweight B&W Insulating Firebrick store and conduct less heat, thus provide faster heating up time and lower fuel consumption. These brick also respond rapidly to changes in heat input, assuring excellent temperature control.

The defense plant expansion program has created unprecedented demands for B&W Insulating Firebrick. It is, therefore, necessary to anticipate your requirements as far in advance as possible.

KAOCAST FLOOR TAKES PUNISHMENT

In this same furnace, a floor of B&W Kaocast, the 3000 degree refractory castable, withstood the spillage of crucibles . . . eliminated the need to renew the floor every time a crucible was replaced.

BABCOCK & WILCOX

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R-384

B&W REFRACTORIES PRODUCTS — B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS—Stationary & Marine Boilers and Component Equipment... Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

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DELTA Permi-Bond (seacoal replacement)
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DELTA Core & Mold Washes for steel, malleable, gray iron and non-ferrous metals.
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Liquid Parting
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DELTA Core & Mold Washes for steel, malleable, gray iron and non-ferrous metals.
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The quality and uniformity of DELTA SPECIALIZED FOUNDRY PRODUCTS are laboratory controlled to insure consistent results in use. Liberal working samples, together with complete instructions for use will be sent to you without cost or obligation. WRITE TODAY.

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MANUFACTURERS OF
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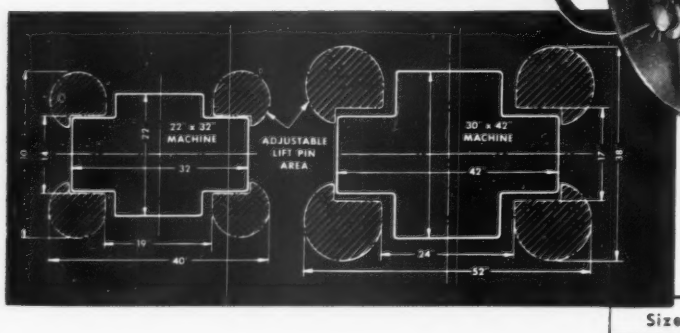
Tabor's Cope and Drag Matched for Speed

▶ Each of these machines is a star performer in its own right. Working together, they're unbeatable for keeping cope and drag production in near-perfect balance.

ROLLOVER FEATURES — completely power operated; shockless machines completely portable up to 1000 lb. capacity; new jarring end designed for peak effectiveness; plain jar or shockless jar (*absolutely shock-free*); plate-locking device to stop all plate wobble or "secondary jolt"; quick change-over plate to protect against varying work; double air-operated clamps for top speed operation; internal jarring valve; complete cycle of operations in the *fractional part of a minute.*

JAR FLASK LIFT FEATURES — available in stationary or portable models; plain or shockless jar; adjustable flask lift pins to cover a wide range of flask lengths and widths (see diagram); Tabor's famous air-on-oil draw; working access from three sides.

PUT THEM TOGETHER IN YOUR FOUNDRY —and you have a team with ability and flexibility. They'll roll where you want them—meet critical schedules in the production shop—put high-production features into short-run work in the jobbing shop. And—traditional with Tabor—give long life at low up-keep.



Size of Machine	22" x 32"	30" x 42"
Capacity—80# Air	600#	1000#
Patt. Draw.—Plain Jar; Oil Controlled	10"	12"
Patt. Draw.—Shockless; Oil Controlled	9"	12"
Height Table from Floor—Portable	28"	32"
Height Table from Floor—Stationary	26"	30½"
Weight Shockless Jar	2600#	4000#
Weight Plain Jar	1900#	2700#

REPRESENTATIVES

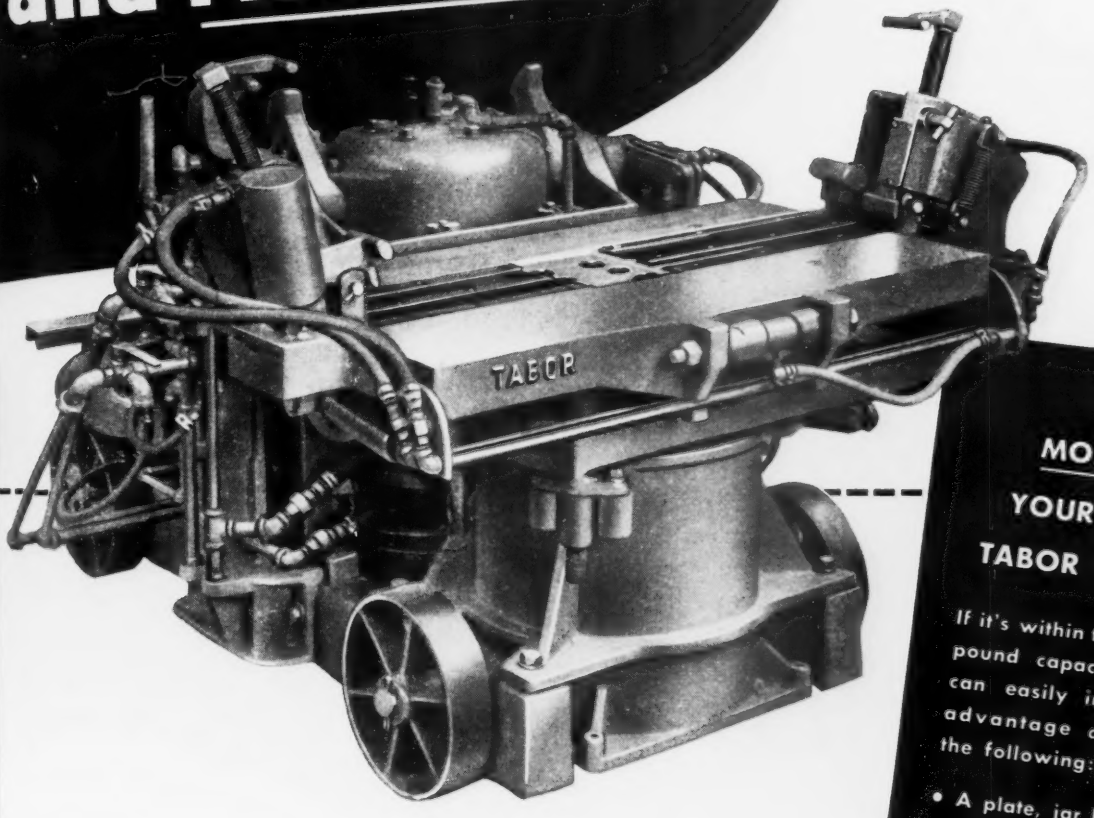
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

save labor

Team...

Size of Machines	Sizes of Rollover Plates		Length of Pattern Board when using Flask Clamps		Height Plate from Floor		Max. Space for over-all depth of Flask, Pattern Board and Bottom Boards	Draw	Capacity (lbs.)
	Width	Length	Min.	Max.	Plain Jar	Shockless Jar			
22"	22"	42"	16"	43"	25"	29"	17½"	10"	600 lbs.
30"	30"	40"	20"	53"	27¾"	32¼"	20½"	12"	1000 lbs.

Machines and Flexibility



MODERNIZE YOUR PRESENT TABOR ROLLOVER

If it's within the 600 to 3,000 pound capacity range, you can easily install to great advantage any or all of the following:

- A plate, jar head, and jar piston made of steel
- Plate-locking device
- Quick change-over plate and double clamps
- Air-operated mold receiver

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES

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buy Tabor

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

AIRCO MACHINE GAS CUTTING

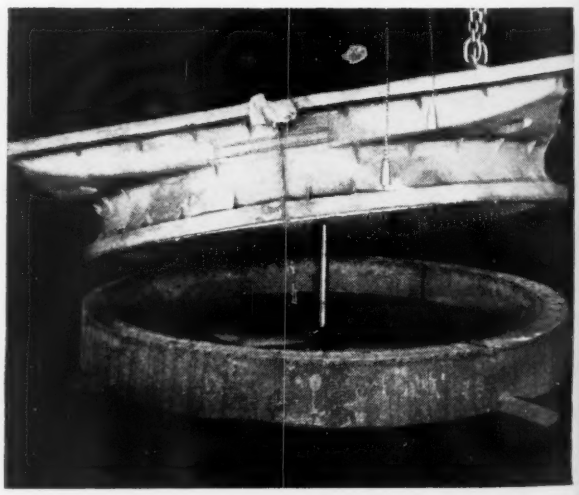
...speeds riser removal
...minimizes grinding
...increases accuracy
...reduces operator fatigue

Cutting risers with an Airco gas cutting machine saves time, greatly decreases grinding and/or machining—and by reducing operator fatigue, it increases and speeds-up production.

Here, for example, is illustrated a simple machine set-up that permits fast, accurate riser cutting. Using an Airco Radiagraph, the casting – measuring 105″ in diameter and 5″ in thickness – is trimmed at a speed of 5″ per minute. More important, the Radiagraph cuts so close to final machining specifications that slow expensive machine work or grinding is eliminated, and a costly production bottleneck is done away with.

This actual case history demonstrates the advantages of removing gates and risers by machine gas cutting. Airco gas cutting machines are easily adaptable to any cutting requirements – straight line, circle, or bevel-edge cuts.

If you would like further details on how machine gas cutting, as well as other Airco oxyacetylene processes can save time and money for your foundry operation, call or write your nearest Airco office – today.



Top photograph shows the simple set-up that makes easy work of a tough job. Above you see the clean, accurate cut, ready for machining.

AIRCO

AIR REDUCTION

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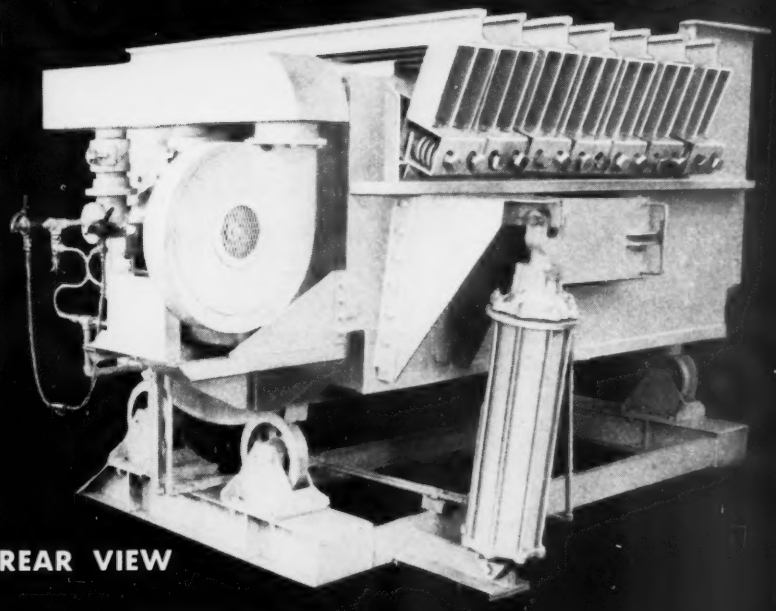
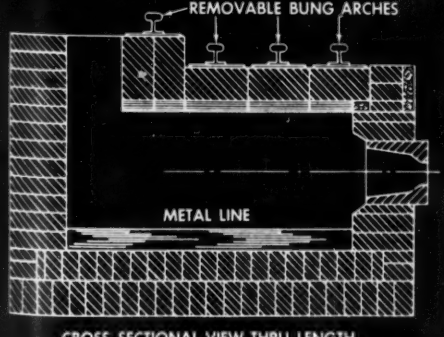
Another NEW STROMAN REVERBERATORY FURNACE FOR COPPER ALLOYS or IRON!

The Most Economical Furnace Ever Made to Handle Capacities from 400 to 10,000 pounds per heat.

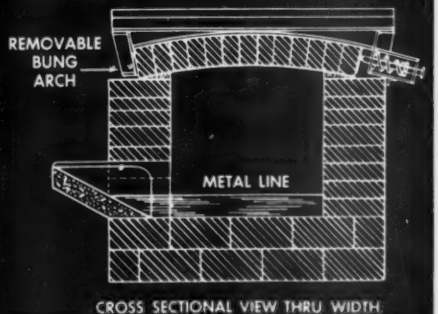
FRONT VIEW



REAR VIEW



CROSS SECTIONAL VIEW THRU LENGTH



CROSS SECTIONAL VIEW THRU WIDTH

Stroman "JC" Reverberatory Furnaces are built on the same basic ideas as the "air furnace" except that it is smaller and tilts instead of taps to pour . . . MELTING TIMES are the lowest known, ranging from 15 minutes to 2½ hours according to size of furnace and charge. It is excellent for COPPER BASE ALLOYS of low zinc content (containing not over 7% zinc). For such alloys, no more economical method has ever been devised for handling, melting, maintenance, charging, pouring and fuel consumption . . . and you can switch from one alloy to another without contamination. Castings produced from the "JC" are of excellent grain structure and free from porosity. Metal loss is lowest of any other type furnace. IRON MELTING . . . These furnaces will bring cold charges of iron up to casting temperatures of 2800° F., or they may also be used as a holding furnace of metal from a cupola. The "JC" is also highly recommended for special heats as well as production work. It has a decided advantage over a cupola in that it can be used for 6 to 8 successive heats a day. Cupolas cast just once a day. This enables a foundry to operate in slow times as a full crew is not necessary for ample production. These furnaces are gas, oil or combination gas-oil fire. They are automatically tilted and handle their metal perfectly. For greatest speed of melting and utmost economy investigate the Stroman "JC" Reverberatory . . . it will open the door to greater profits for you.

Write for full information and specifications today.

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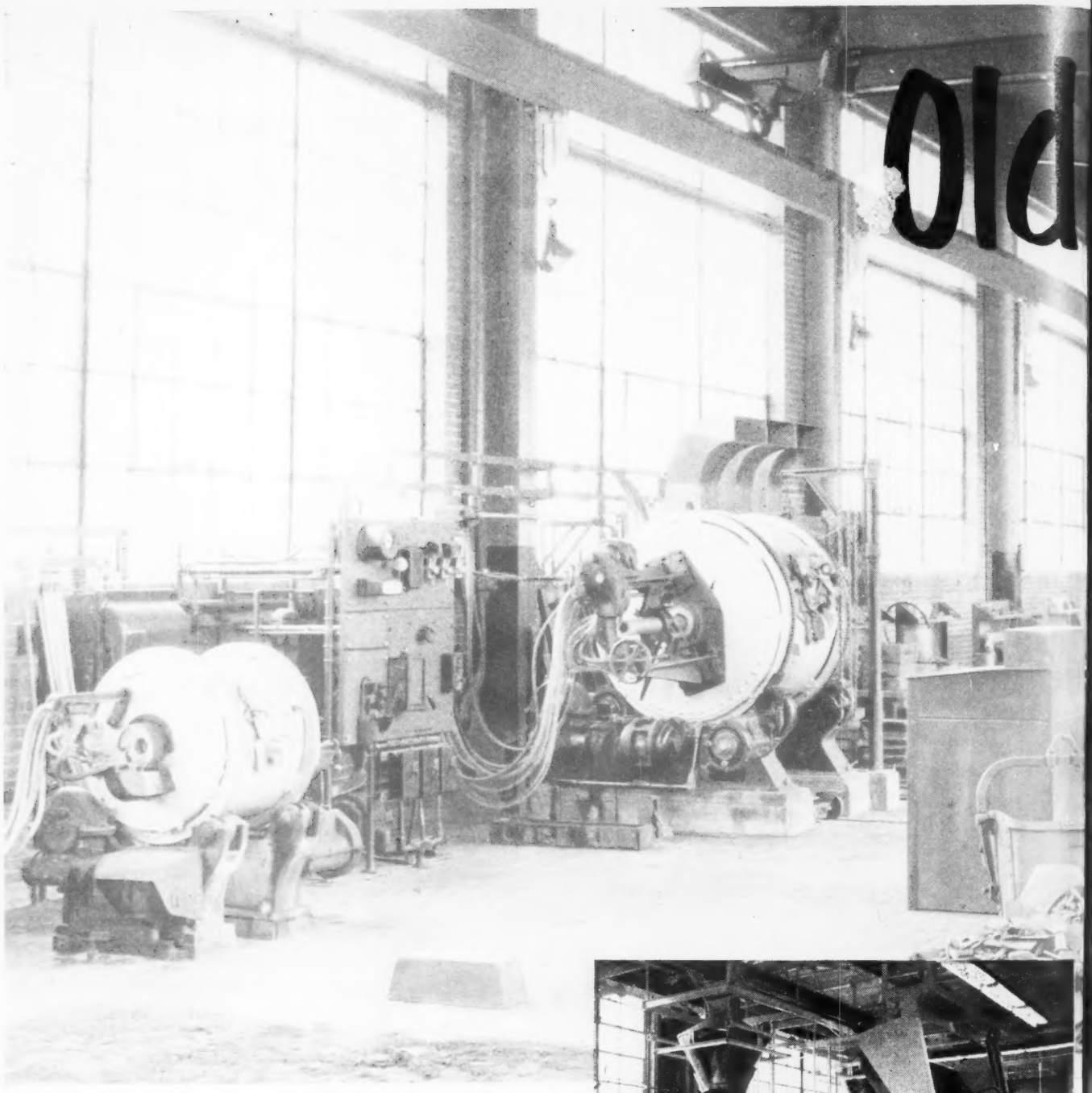
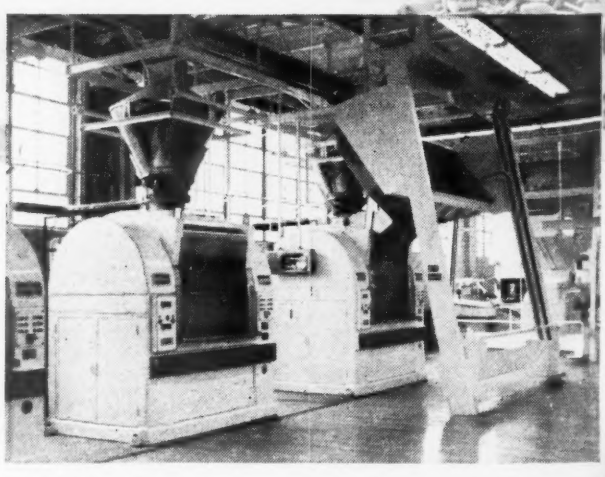
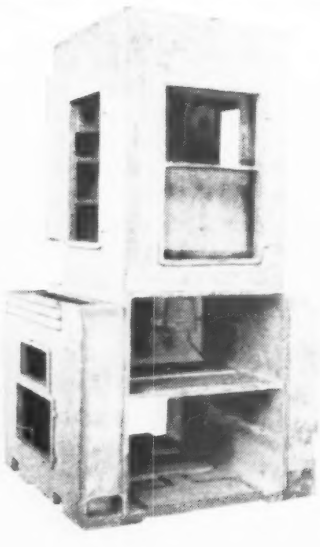
STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.







Above: *The electric furnace section of Baker Perkins foundry at Saginaw, Michigan. Left, Type LFA, 350 lb.; right, Type AA, 1000 lb.*

Left: *Casting for machine tool base, produced by Baker Perkins.*

A battery of Baker Perkins dough mixers, one equipped with dough trough elevator. Baker Perkins also manufactures mixing machinery used in processing of candy, chewing gum, cold creams, paints, soap, tooth paste, and many other products.

enough to vote!

These 22 year old Detroit ROCKING Electric Furnaces produce high-quality iron melts every working day...

Baker Perkins, Inc., makes bakery machinery and chemical mixing machinery, and produces castings for other manufacturers. To supply the company's needs for a variety of special iron and steel melts, there are two Detroit Rocking Electric Furnaces in the foundry.

These two furnaces are 22 years old, and they still turn out efficient melts of nickel irons and steels day after day.

Precise control of analysis is one of the outstanding characteristics of Detroit Electric Furnaces. The melt is completely homogeneous because of the rocking action. There's no carbon pick-up from electrodes, since they are free of the bath at all times.

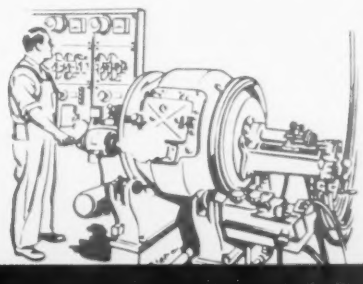
Temperature control is extremely accurate, too. A desired melting cycle can be established and closely followed through melt after melt, resulting in fast, most efficient operation.

Detroit Rocking Electric Furnaces bring economies to the foundry floor through optimum use of power, minimum heat loss, less metal shrinkage, more heats per working days, reduced out-of-production time because of longer refractory wear and easy shell replacement.

Furnace capacities—for ferrous and non-ferrous melting—range from 10 to 4000 pounds, and are individually designed to meet your plant's electrical specifications.

Get the advantages of Detroit Rocking Electric Furnace operation in your plant. Outline your operating needs and we'll show you how these furnaces can help you. Write today!

aster melts, better melts



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KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

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... used on EVERY TYPE of portable

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SMOOTHING EDGES
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... more proof that Only CARBO

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high-speed **PORTABLE GRINDING...**

MOUNTED WHEELS

CLOTH DISCS

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CLOTH SLEEVES

grinding operation in metalworking...

ROUGH GRINDING
Cup Wheel

DEBURRING
"MX" Wheel or Cloth Disc

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Cloth Sleeve

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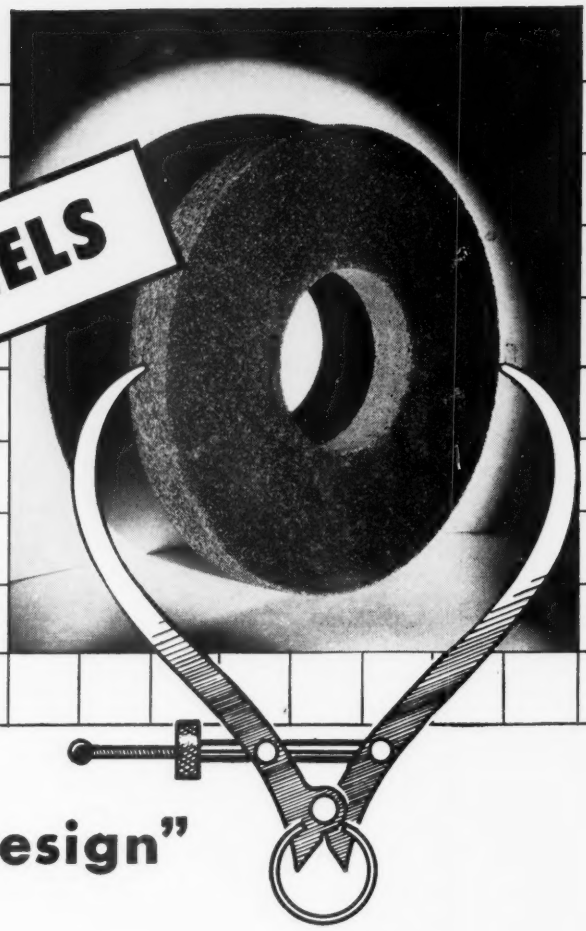
offers ALL abrasive products...to give you the proper ONE

MANHATTAN SNAGGING WHEELS



"The Wheels You Design"

In effect, your requirements design the Manhattan Snagging Wheels you buy. They are custom-tailored for your castings and grinding conditions. Hardness and composition, size and type of abrasive and the bond to be used are all specified after careful analysis of what you need. The result — you remove more metal faster at lower cost.

For swing frame grinders, stand grinders and portable grinders let Manhattan abrasive wheel engineers custom-tailor the right snagging wheels for the job.

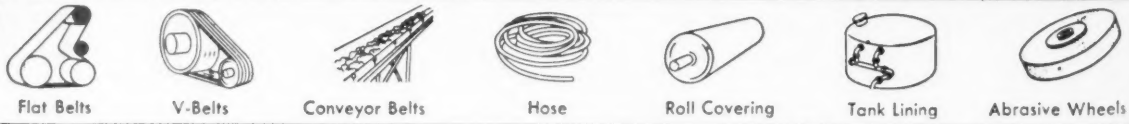
GRINDING WHEEL INSTITUTE MEMBER

WRITE TO ABRASIVE WHEEL DEPARTMENT

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



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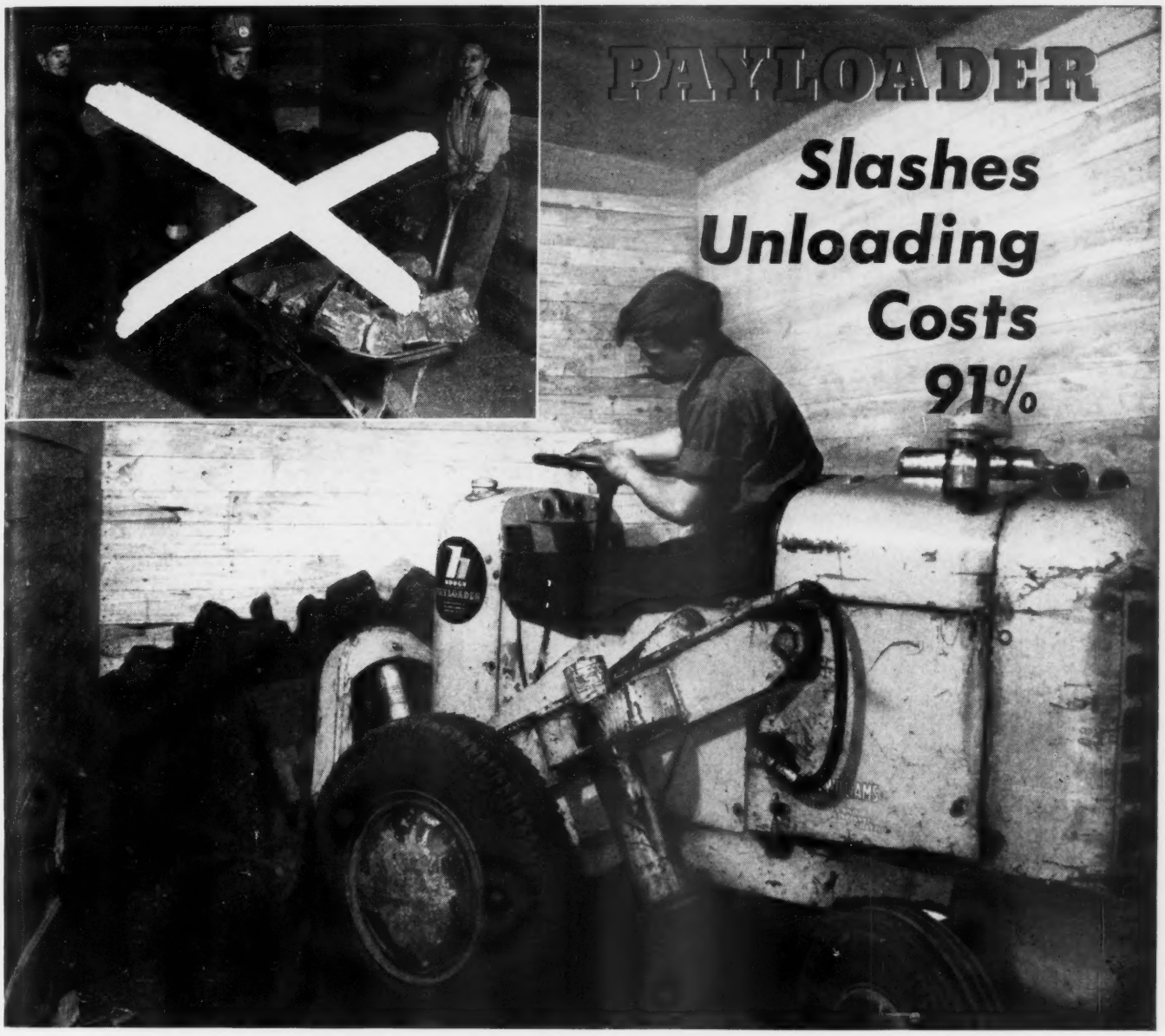

* A complete report on Timken's use of "PAYLOADERS" for bulk material handling is found in Vol. 1, No. 3 of INDUSTRIAL HANDLING. Copy of this is available for the writing. Literature on any of the "PAYLOADER" models is also available, without obligation: the 12 cu. ft. Model HA, the 15 cu. ft. Model HAH, the ½ yd. HE, the ¾ yd. HF, the 1¼ yd. HY or the big 4-wheel drive Model HM.

At Timken Roller Bearing Company,* three men, with hand shovels and wheelbarrows, used to work hard for 20 hours to unload a 50 ton car of heavy lump ferromanganese. Now, one man on the "PAYLOADER" tractor-shovel does the job easily in 5 hours — so that unloading time is reduced 75% and manhours are reduced 91%. This is only one example in hundreds where the "PAYLOADER" has effected amazing savings in time, labor, and costs . . . in loading, unloading, transporting, piling, spreading, and dumping all kinds of bulk materials.

This distinctive tractor-shovel is completely Hough-built *expressly for tractor-shovel work,* with superior features that insure more production and satisfaction — such advantages as several speeds in BOTH directions, and large pneumatic tires that work on ground or floors. If *you* have bulk material handling problems "PAYLOADERS" can probably help you solve them. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. · *Since 1920*

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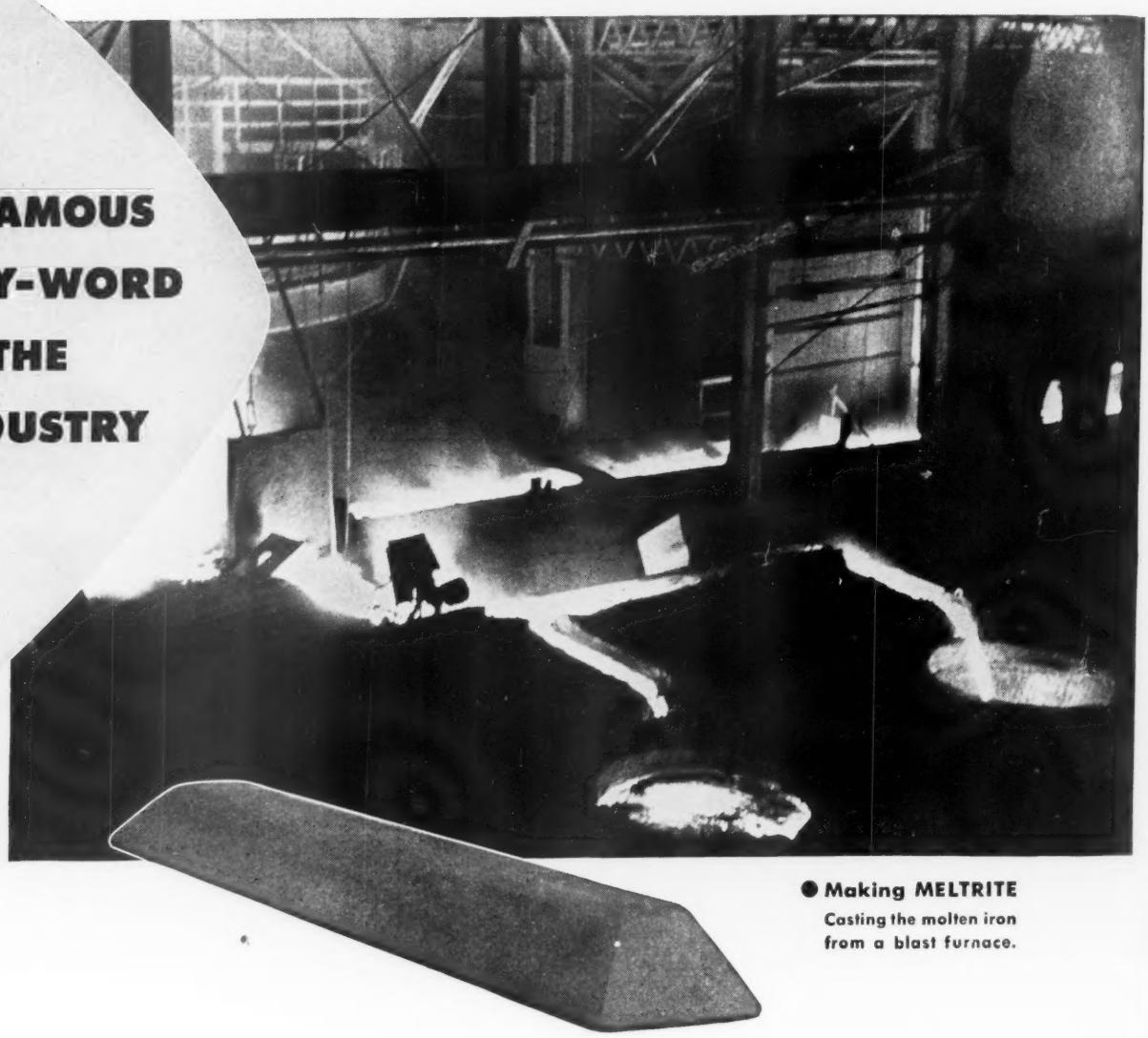
A FAMOUS BUY-WORD IN THE INDUSTRY



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Casting the molten iron from a blast furnace.

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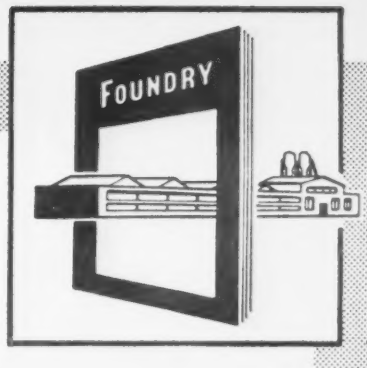

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Cleveland, Ohio

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No Postage Stamp Necessary if Mailed in the United States

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Penton Building
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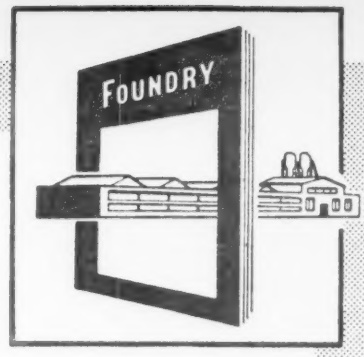
FDY 9-52



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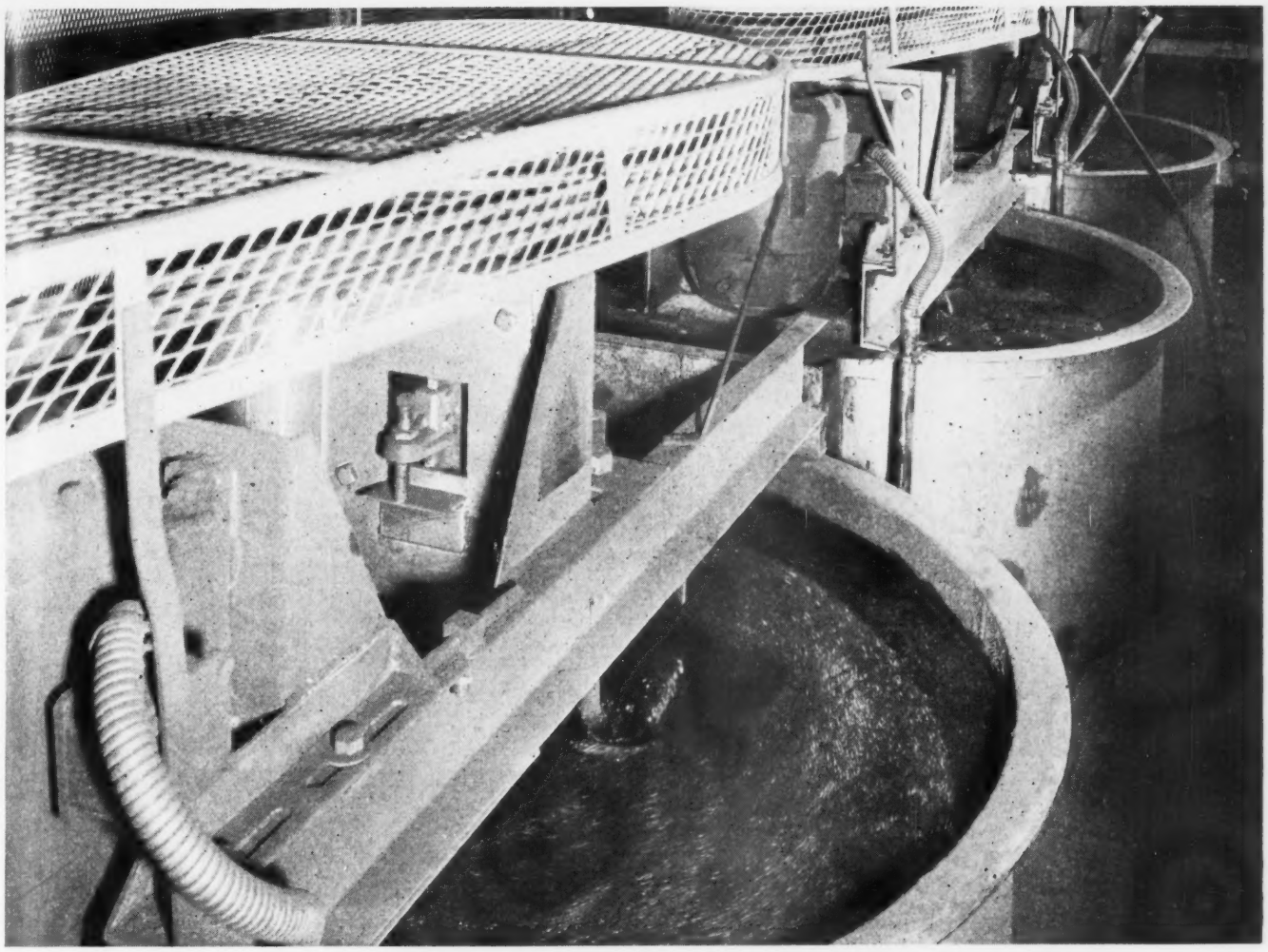


Foundry Sand Costs Can Be Cut As Low As 75¢ A Ton With Denver Reclamation

You can increase your profits by using a Denver Sand Reclamation System. If your new foundry sand costs, delivered, are above $2 a ton, you can cash in on extra profits with Denver reclamation. Denver Sand Reclamation Systems recover sand for as low as 75c a ton. Many foundries prefer reclaimed sand for quality castings.

Denver Sand Reclamation Systems report daily savings of $200 to $400 on new sand costs. One of the big factors of high production and low costs is the patented Denver Heavy Duty Sand Scrubber, pictured above. Bonding material and slime on the surface of sand grains are removed by attrition of grains striking one another at high velocity in a water and sand mix.

Controlled recirculation without short circuiting insures complete scrubbing. Scrubbing mechanisms are of extra heavy construction with abrasion-resistant rubber covered parts in areas of high wear. The scrubber will start on a full load—no sanding up on shutdowns. Water consumption is low. You get simplicity of installation and operation, and an 80% to 90% recovery.

Equipment cost for the average small foundry, treating 2 to 3 tons of sand an hour, is approximately $6,250 fob factory, exclusive of drying equipment.

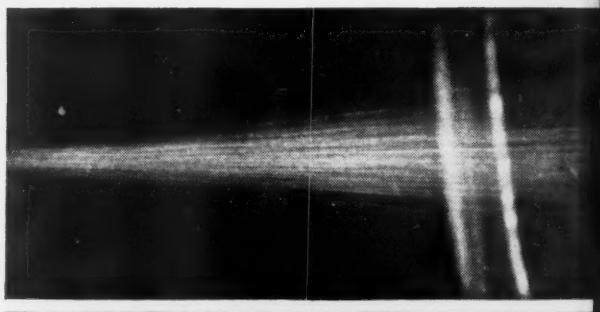
Denver Equipment Company has been a leader in mineral flotation and recovery equipment for 25 years. Our engineers can plan and supply you with all necessary equipment for a complete Foundry Sand Reclamation System. Find out how you can cut your foundry sand costs to as low as 75c a ton! Write, wire or phone today for test, horsepower and floor space data.

Our 25th year

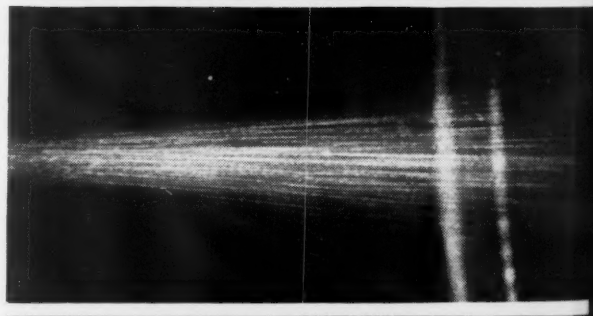
DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH ST. **DENVER, COLORADO**

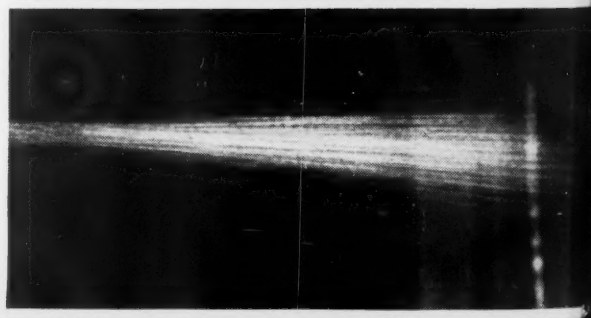
You Can Increase Nozzle Life



High speed photograph of stream from new iron nozzle — note that stream concentration and abrasive velocity and volume are fair.



Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size — stream concentration poor, abrasive velocity and volume low.



Stream from Norbide Nozzle after 404 hours with sand — outlet diameter worn only 0.032"—hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume.

NORTON WEAR-RESISTANT PRODUCTS

Every Time with NORBIDE Nozzles*

IF YOU ARE LOOKING FOR longer nozzle life and more service per dollar cost — then it will pay you to examine the performance of NORBIDE* Nozzles — the most wear-resistant nozzles ever made.

IF YOU WANT to decrease air consumption as much as 20% (over cast iron nozzles) —

IF YOU WANT to improve blast cleaning efficiency by using nozzles that maintain stream contour and abrasive velocity for a long period of service —

IF YOU WANT to do away with costly, time-consuming "down-time" brought about by short nozzle life —

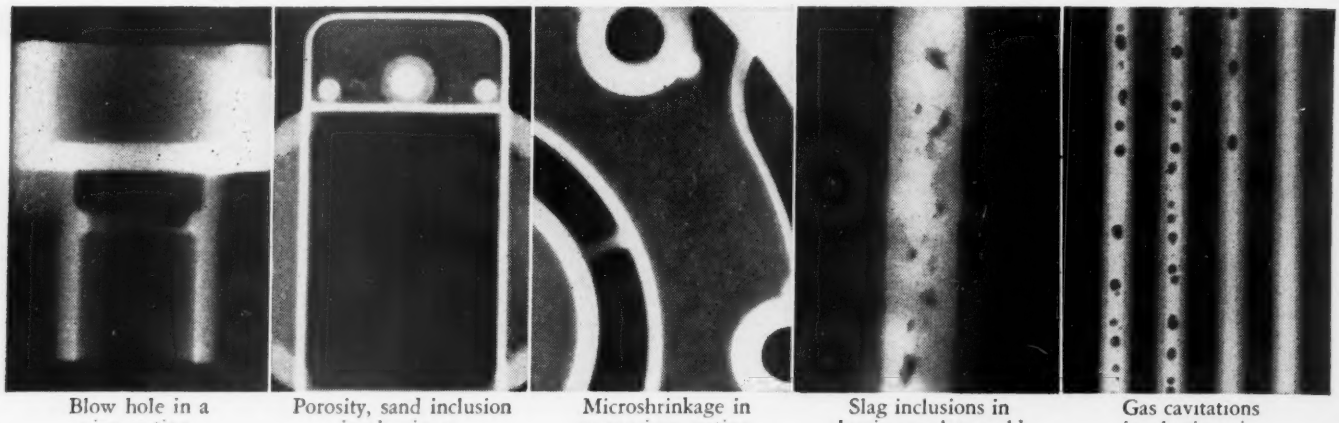
THEN INQUIRE TODAY about long-lived NORBIDE Nozzles, made of Norton Boron Carbide — "the hardest material made by man". **Write for informative bulletin and price list No. 543-F.**

NORTON COMPANY, Worcester 6, Mass.

*Trade-mark Reg. U. S. Pat. Off.

NORTON COMPANY · WORCESTER 6, MASS. NORTON

Typical sections inspected by GE OX-140 x-ray units



Blow hole in a zinc casting. | Porosity, sand inclusion in aluminum. | Microshrinkage in magnesium casting. | Slag inclusions in aluminum plate weld. | Gas cavitations in plastic rods.

Put quality control on a production-line basis

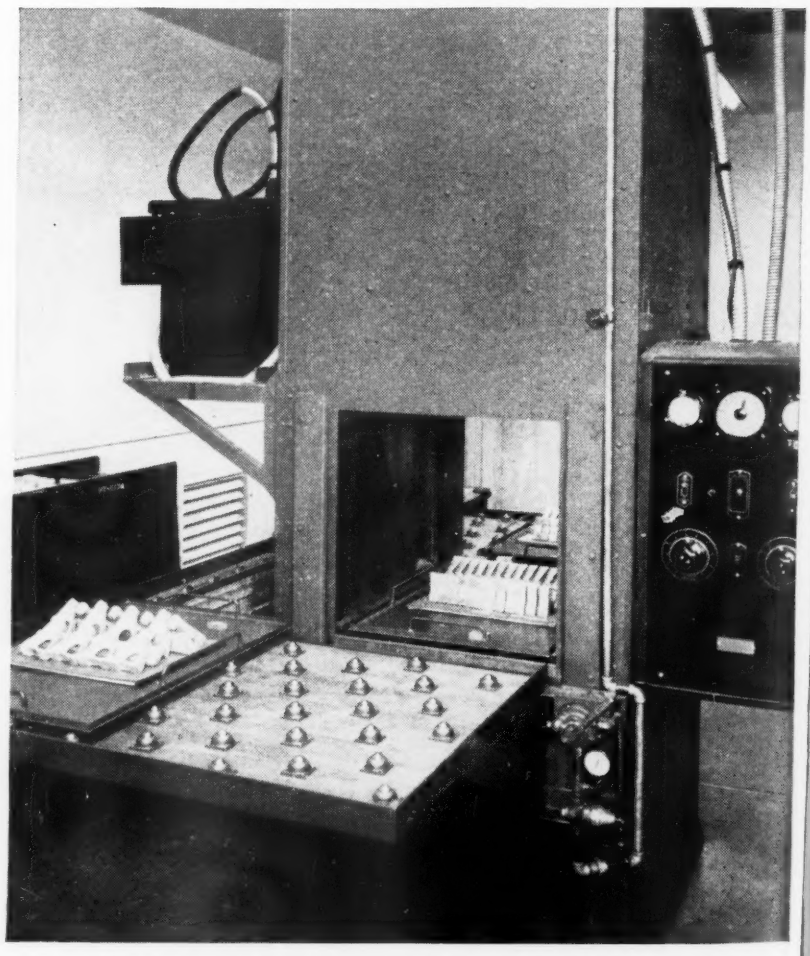
GE semi-automatic OX-140 provides fast, accurate x-ray inspection of large production lots

Quality control engineers are always under pressure not to delay production schedules for testing and inspection. General Electric offers you x-ray inspection apparatus that permits both speed and control of processes—the semi-automatic OX-140.

This unit is designed for fast, economical inspection of materials like aluminum, magnesium, plastics, and handles sheets, tubes, rods — as well as cast sections.

Compact, flexible, fully protected and safe, the OX-140 features full built-in radiation protection without the expense of special rooms. "Open down" doors guard against operator injury. The doors also automatically initiate x-ray exposure on closing.

If you have an inspection problem in your plant, call the GE x-ray representative near you. The OX-140 is just one of many x-ray units General Electric has developed to help industry do a better job . . . faster. For literature, write X-Ray Department, General Electric Company, Milwaukee 1, Wisconsin, Rm. YY-9.



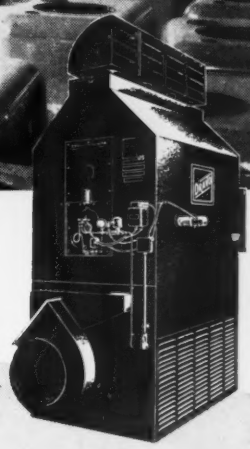
GENERAL ELECTRIC

Semi-automatic OX-140 has two tables on either side that support pre-setup trays of parts on ball bearings. Work moves continuously because personnel doesn't have to leave the room during exposure. One aircraft company radiographs four times as many parts with their OX-140 as they formerly had been able to inspect with conventional unit. Fewer man-hours are needed.

ANOTHER EXAMPLE OF VERSATILITY...

10 DRAVO *Counterflo* HEATERS

PROVIDE COMPLETE HEATING AND VENTILATING FOR HOMESTEAD VALVE PLANT, AT CORAOPOLIS, PENNA.



Homestead Valve Manufacturing Company, makers of Hypressure Jenny Steam Cleaning Units, uses Dravo *Counterflo* Heaters three ways at its Coraopolis, Penna., plant.

1. TEMPERING MAKE-UP AIR

Pickling, washing, drying, painting, welding and testing create contaminated and unpleasant air conditions. Two Dravo Heaters supply 44,000 cu. ft. of tempered make-up air per minute for replacement of exhausted fume-laden air.

2. COMFORT HEATING

Eight Dravo Heaters maintain a 70° F. temperature throughout the 400 ft. x 100 ft. building which contains the plant, offices, lavatories and storage rooms. The choice of gas or oil as fuel guarantees warm working conditions in spite of occasional gas shortages in very cold weather.

3. SUMMERTIME VENTILATION

During hot spells, the heater fans circulate air throughout the building, thus keeping employes more comfortable.

DRAVO HEATERS OFFER YOU . . .

LOW INITIAL COST—Users report 30% to 60% savings over "wet-type" systems.

EASY INSTALLATION—Need only fuel, exhaust and electrical connections . . . no ductwork.

LOW OPERATING COST—Direct-fired . . . burn gas or oil . . . readily converted . . . minimum efficiency 80%.

AUTOMATIC OPERATION—On-off or modulating controls . . . no constant attention needed.

LONG SERVICE LIFE, LOW MAINTENANCE—Stainless steel combustion chamber eliminates refractory lining.

SAFETY—Approved by American Gas Association, listed by Underwriters' Laboratories, Inc.; Dravo standardized safety control circuit accepted by Factory Mutual Engineering Division.

MOBILITY—Can be moved to any location.

FLEXIBILITY—When floor space is limited, can be wall-hung or suspended from trusses in any position.

MAIL THIS COUPON FOR MORE INFORMATION . . .

DRAVO
CORPORATION

PITTSBURGH • ATLANTA • BOSTON • CHICAGO • CINCINNATI CLEVELAND • DETROIT • NEW YORK • ST. LOUIS • PHILADELPHIA WASHINGTON

Sales Representatives in Principal Cities

Manufactured and sold in Canada by Marine Industries, Ltd., Sorel, Quebec. Export Associates: Lynch, Wilde & Co., Washington 9, D.C.

Heating Department, Dravo Corporation
Dravo Building, Fifth and Liberty Avenues
Pittsburgh 22, Penna.

I would like more information about Dravo Counterflo Heaters. Please send me Bulletin No. EF-523-2435.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Why *Brass* can better serve your needs

Outstanding Performance

BRONZE GEARS, BUSHINGS AND BEARINGS POSSESS LONGEVITY UNDER CONSTANT USAGE . . .

Heavy duty machinery, which requires rugged mechanical endurance necessitates the use of materials, which must perform for extended periods of time under severe strains.

The use of bronze under these conditions is a must. Only in bronze can be found the unusual combination of plasticity, durability, strength and wear resistance required.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal — Vol. 8, No. 3 — containing an article discussing "Gates and Risers."

Specify—LAVIN NONFERROUS INGOT—*Quality*

Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys

R. LAVIN & SONS, INC.

- *Refiners of Brass, Bronze and Aluminum*
- *Producers of Zinc Base Die Casting Alloys*

3426 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

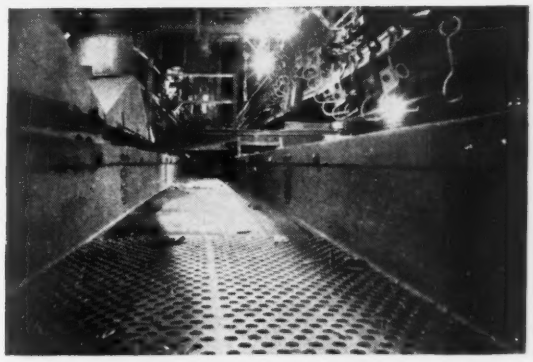
R. LAVIN & SONS, INC. 1900 52 Years 1952 SERVING THE FOUNDRY INDUSTRY

HEWITT-ROBINS

FOR TOUGH MATERIALS HANDLING JOBS

Hewitt-Robins Vibrating-Conveyor

Handles Anything a Belt Conveyor Can't



Faster: The Vibrating Conveyor moves a full pan load of material . . . hot or cold, wet or dry, lump or pulverized . . . quickly, quietly . . . on the horizontal—downhill—uphill to 10°.

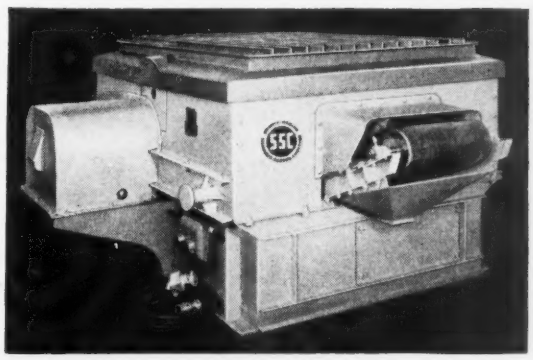
More Efficient: Won't bog down even when loaded to the top of the pan—takes multiple feeds—starts under full load—has feeder action—spreads surges.

Easier To Install—Maintain: The Vibrating Conveyor requires no heavy foundation because vibration in the base structure is kept to a minimum—needs lubrication at only 4 points.

For complete facts, write for Bulletin No. 135.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

DESIGNED FOR FOUNDRY SAVINGS



Hewitt-Robins SSC® Unit

5 Foundry Operations with 1 Piece of Equipment

Saves Time: This one compact, self-contained unit takes care of your entire shakeout and sand removal in a single operation.

Saves Space: Requires no more space than the average-size shakeout, yet it serves 5 complete foundry functions . . . flask shakeout—sand screening—lump breaking—conveyor feeding—tramp-metal trapping!

Saves Money: In one jobbing foundry, where it normally took 8 men a total of 7 hours to completely shakeout molds and reclaim sand, the entire foundry floor was cleaned up in just 3 hours by only 3 men and an SSC Unit.

Saves Trouble: Entirely automatic . . . The Hewitt-Robins SSC Unit needs no attention . . . just put the flask on the shakeout deck—turn on the power and the material flows smoothly from sequence to sequence until the Feeder Belt Conveyor discharges the sand.

For complete details, write for Bulletin No. 136

HEWITT-ROBINS INCORPORATED
STAMFORD, CONNECTICUT

Hewitt Rubber Division • Robins Conveyors Division • Robins Engineers Division • Hewitt Restfoam® Division

Most of the California sea lions are captured and shipped by the San Diego Zoo. Hundreds of them have been sent to circuses, zoos and theatrical training quarters all over the world. The training of sea lions calls for intensely patient work. For instance, it usually takes from six months to a year to teach them to balance a big rubber ball, their best known and favorite trick.

Performance..

The amazing tricks of the performing seal are familiar to most of us. But it's not generally known that *only* one species of seal possesses the intelligence necessary for such performance. This is the California sea lion, found off the coasts of Southern California and Lower California in Mexico.

Similarly, foundrymen seeking extraordinary performance in foundry flasks have been able to find it *only* in HINES FLASKS. Designed for efficient operation and built for rugged usage, HINES FLASKS outperform all other flasks. As a matter of fact, they'll surpass *any* type of foundry equipment in cutting costs.

So remember, it's no trick at all to get top performance in foundry flasks—just be sure to use HINES FLASKS.

Hines **FLASKS**

HINES POP-OFF FLASK

THE HINES FLASK CO.,

3431 WEST 140TH STREET, CLEVELAND 11, OHIO · TELEPHONE: ORCHARD 1-2806

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Why 3 Per Cent Chrome Steel Makes Good Castings for Wear Resistance

Castings of 3 per cent chromium steel have been used in substantial tonnages, for many years, for various equipment parts demanding good wear resistance. Such castings offer an excellent combination of hardness and toughness. Typical applications are crusher parts used in rock- and ore-crushing equipment, swing hammers for pulverizing coal, railroad switch frogs, gears, pulleys, sheaves, and other castings that must meet severe conditions of wear.

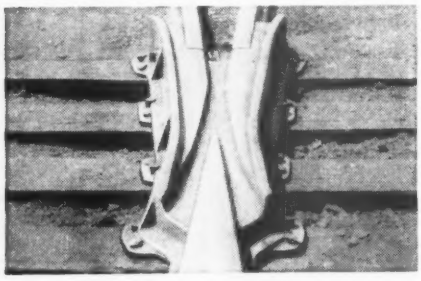


Fig. 1. Railroad switch frogs, which are subject to severe wear, give outstanding service when cast of 3 per cent chromium steel.

The 3 per cent chromium steels, are normally produced in a carbon range of 0.30 to 0.50 per cent. They exhibit excellent depth-hardening properties, which simplify heat-treatment and insure uniformity throughout heavy sections. The analysis is usually modified by a molybdenum addition, since this element aids in increasing hardenability.

Fig. 2. Grating for top of shake-out machine is cast of 3 per cent chromium steel to give good wear resistance and long life.

Properties Improved by Heat-Treatment

The best properties of 3 per cent chromium steels are developed through heat-treatment. Generally, this consists of a normalizing treatment from 1650 deg. F., followed by tempering in a range between 1000 and 1250 deg. F., depending on the physical properties desired. Double normalizing is sometimes used to obtain further improvement in the grain structure. With carbon on the high side of the specification, air-quenched castings show a Brinell hardness number of over 400 in 3-inch sections. This hardness is practically uniform throughout the section. Oil quenching is employed to produce higher hardness and depth of penetration, and even in a 4-inch section, a hardness number of over 500 Brinell is obtained.

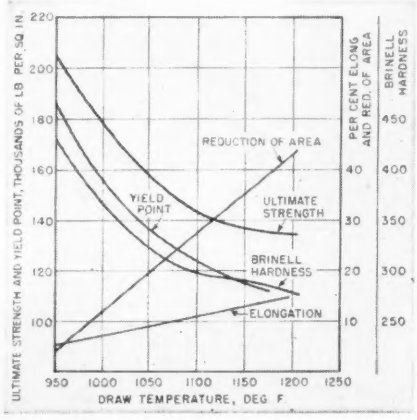


Fig. 3. These curves show the response to tempering of a 0.37 per cent carbon, 2.93 per cent chromium, 0.35 per cent molybdenum steel previously normalized from 1650 deg. F.

The steel also shows good response to tempering. After a normalize and a 1100 deg. F. treatment, it has a tensile strength close to 150,000 pounds per square inch, with an elongation value of about 12 per cent, and a Brinell hardness of about 300. When greater ductility is required, tempering should be done at higher temperatures. However, in such instances, some strength and hardness are sacrificed.

Fig. 4. Photomicrograph of 3 per cent chromium steel normalized from 1650 deg. F. and tempered at 100 deg. F. (X250). The pseudo-martensitic structure is well suited to resist abrasion.

Effect of Other Alloy Additions

Molybdenum in the range from 0.30 to 0.50 per cent will improve depth-hardening characteristics and aid in reducing susceptibility to temper brittleness in the lower temperature ranges. If the molybdenum-bearing steel contains relatively high carbon (0.40 to 0.60 per cent) additions of approximately 0.08 to 0.10 per cent vanadium provide greater uniformity in hardening. Small additions of silicon increase strength and hardness and this element is sometimes increased to 0.80 or 1.00 per cent. Manganese is added in amounts between 0.50 and 0.80 per cent.

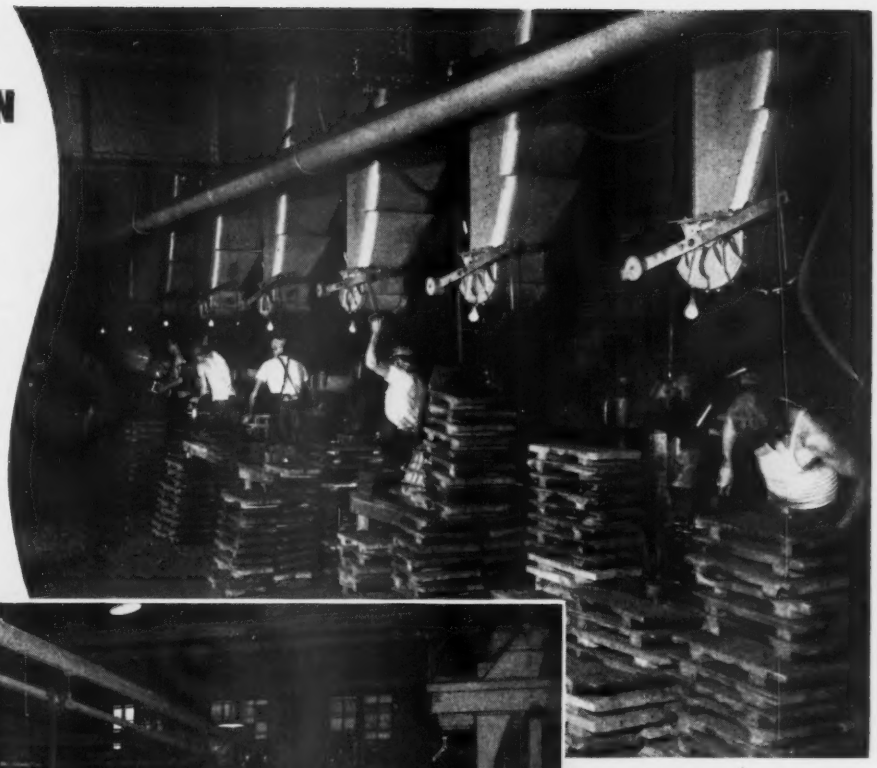
Metallurgical Service Available

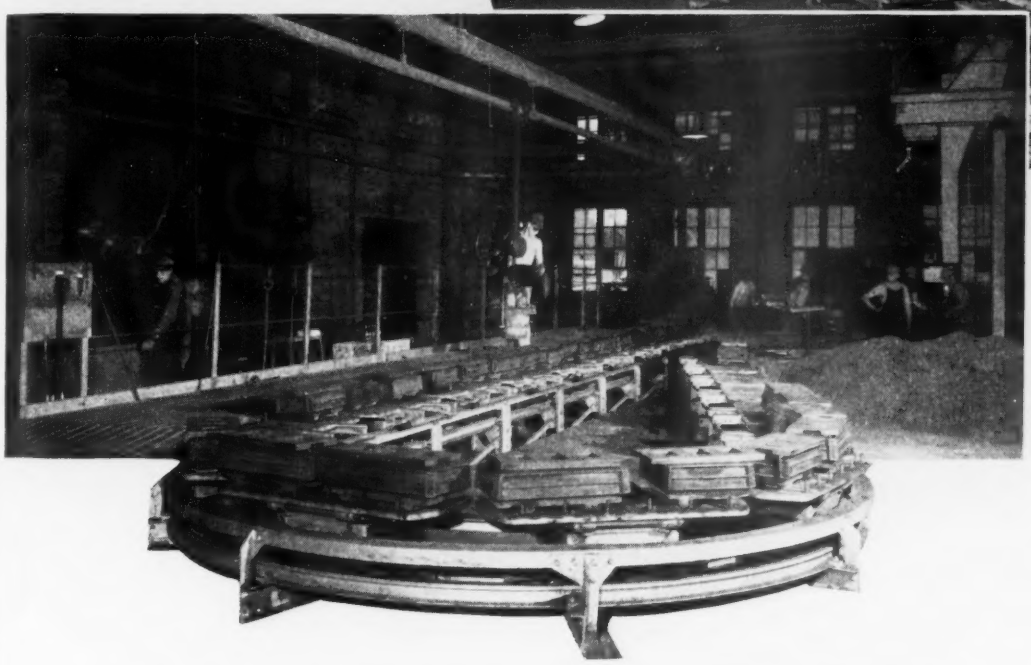
When you have occasion to produce castings for applications involving severe abrasion and wear, it will pay you to investigate the advantages of using 3 per cent chromium steel. If you need help on some specific metallurgical problem, be sure to consult one of ELECTROMET's specially trained metallurgists and engineers. For further information, write to the nearest ELECTROMET office: in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York, Pittsburgh, or San Francisco. In Canada: Welland, Ontario.

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

NO MODERNIZATION WITHOUT MECHANIZATION

So Call In a JEFFREY ENGINEER





These two photos depict a Jeffrey-equipped Foundry. It is completely modernized to provide the ultimate in plant efficiency. Our Foundry Engineers are generous in their desire to help you modernize your operations.

There must be a heap of satisfaction in having a completely-modernized Foundry . . . a smooth-running and harmonious system. Jeffrey has the equipment . . . the engineers to help you do just that . . . provide performance that enthuses the owner and the foundry superintendent alike. Give us a chance to go to work for you.

Aerators
Bucket Elevators
Chains
Clamshell Valves
Cleanarators
Crushers

Casting Conveyors
Disintegrators
Feeders
Flask Fillers
Apron Conveyors

Paddle Mixers
Power Scoops
Mold Conveyors
Screens
Sanditioners

THE JEFFREY MANUFACTURING COMPANY

907 North Fourth St., Columbus 16, Ohio

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Birmingham 3 Chicago 1 Denver 2 Harlan, Ky. Milwaukee 2 Pittsburgh 22

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Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

*Overcured Sections — present every 30′ to 40′ in all belts made by the flat press method. Only Rotocuring (continuous, non-stop curing) eliminates this major cause of belt failures.

Here Lies a Good Conveyor Belt ...killed by OCS*

—BWH ROTOCURE prevents these fatalities — look for it in the belts you buy

Press overlaps, inherent in belts cured by flat press methods, are a primary cause of early belt failure. The overlaps result in overcured segments 2″ to 4″ wide across the entire belt because vulcanization is *not* continuous. These 2″ to 4″ segments are *double cured* — and *double curing weakens the structure!*

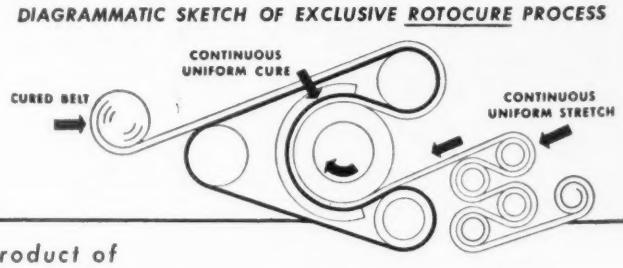
When you buy a BWH conveyor belt made by the *continuous* ROTOCURE process of vulcanization you obtain a *uniformly strong* belt *overall.* The weakened segments due to overlapping that sabotage operations and inflate belting costs are completely eliminated. With continuous, endless vulcanization you'll be ahead four ways:

1. In increased belt flex life — as much as 40%
2. In elimination of mechanical distortion at the press ends
3. In constant, uniform stretch
4. In uniform, abrasion-resistant covers

These characteristics of BWH Conveyor Belts mean minimum belt maintenance costs, longer belt life and appreciable per ton savings in the cost of what you convey! Ask your BWH distributor to show you how these highly serviceable belts can help you. Or write us direct.**

**Ask him also about BWH Rotocured Transmission Belts. Because they permit operation at lower tensions, you are assured of longest possible belt life.

DIAGRAMMATIC SKETCH OF EXCLUSIVE ROTOCURE PROCESS



BWH
DEPENDABLE RUGGEDNESS

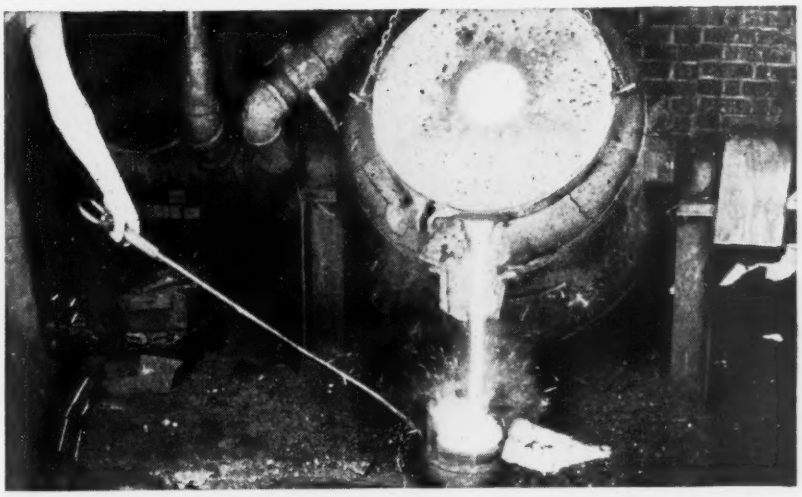
Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

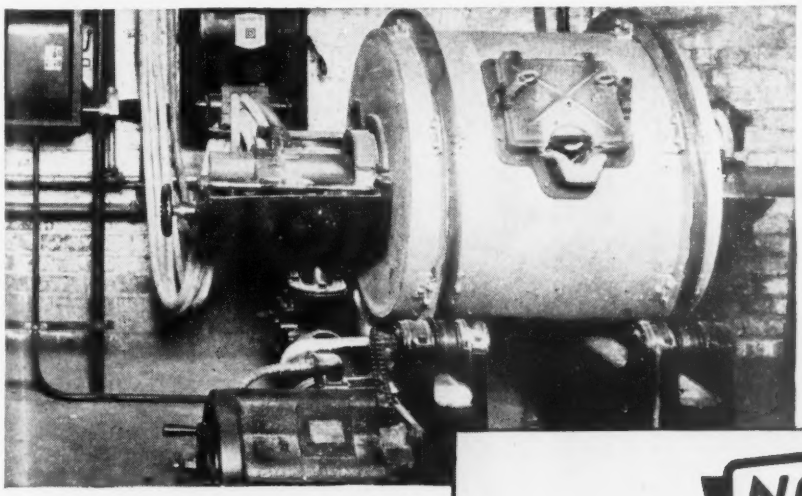
Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P.O. BOX 1071, BOSTON 3, MASS., U. S. A.
WAREHOUSE STOCK, 111 NORTH CANAL ST., CHICAGO, ILLINOIS

THIS REVERBERATORY FURNACE is lined with a Norton CRYSTOLON* refractory cement, engineered to last longer on this particular metal-melting job.



THIS TILTING CRUCIBLE FURNACE has a cover and lining made of a Norton CRYSTOLON refractory cement. It was engineered to fit this firm's individual requirements.



THIS INDIRECT ARC FURNACE owes much of its high output to its lining, made of a custom-engineered Norton ALUNDUM* refractory cement.

Melt more metal per furnace-hour

with refractory linings engineered for you

Every time you interrupt your metal-melting campaigns to patch or replace your furnace linings, you lose production you never get back.

That's why just *any* refractory cement won't do. You want the *one* cement that fits your requirements so exactly that it reduces interruptions to a minimum. Chances are, the one just-right cement hasn't been made yet.

That's where your nearby Norton refractories engineer enters your picture. He's ready to call on Norton Research . . . pioneers for 40 years in the development of special refractories for complicated high-temperature requirements.

Working together, you and Norton Company are sure to arrive at the one CRYSTOLON, ALUNDUM, MAGNORITE* or FUSED STABILIZED ZIRCONIA refractory cement that fits your exact requirements.

For more information about this special Norton service, call your nearby Norton refractories engineer, or write Norton Company, 30 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

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Special REFRACTORIES

Making better products to make other products better

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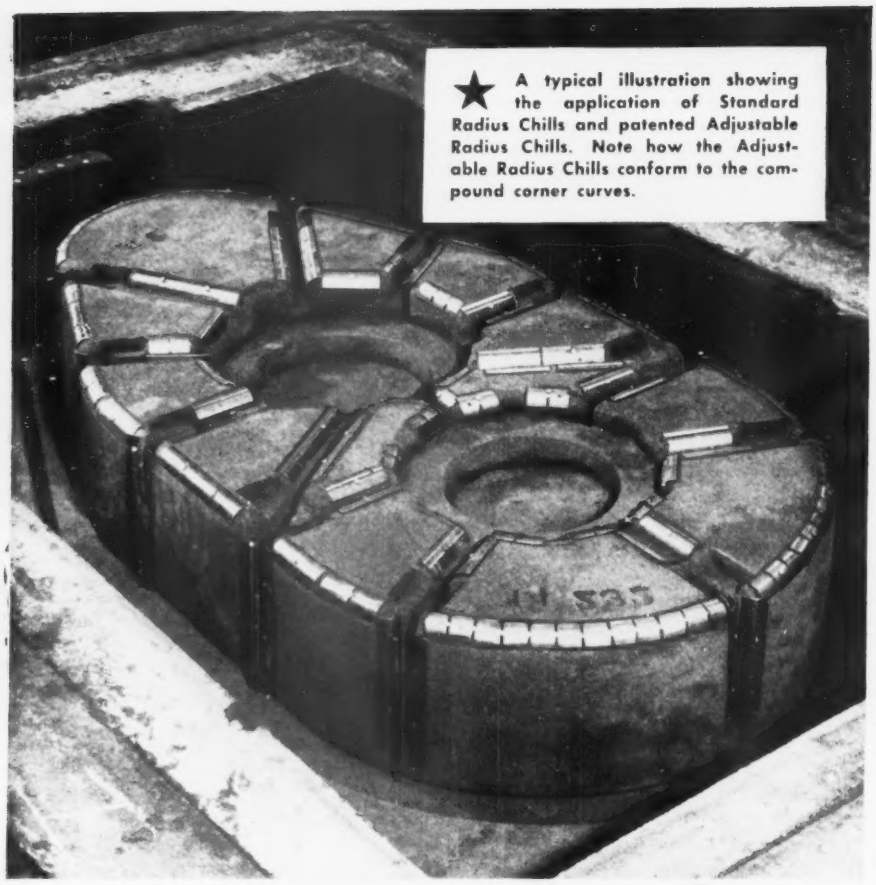


★ A typical illustration showing the application of Standard Radius Chills and patented Adjustable Radius Chills. Note how the Adjustable Radius Chills conform to the compound corner curves.

ASK FOR

Milwaukee

RADIUS CHILLS

Straight Section or Adjustable

Milwaukee straight section Radius Chills have been used to considerable advantage on straight fillets and edges in many leading steel foundries. The new patented Adjustable Radius Chills, with equally spaced slots so that sections may be cut off in one inch segments, fulfill the need where chills are necessary along the fillets of cylindrical, round, or irregularly shaped castings. These Adjustable Chills have effected substantial savings in welding and cleaning costs.

WRITE FOR SAMPLES AND PRICES

Milwaukee Chaplet & Mfg. Co.

1025 SOUTH 40th STREET • MILWAUKEE 4, WISCONSIN

Readers' COMMENT

Clarifies News Release

TO THE EDITORS:

Thanks for your clarification on the Associated Press dispatch. Unfortunately, this is one of those cases where, by withholding the name of the party you were criticizing, the innocent party, namely ourselves, fell victim to the criticism.

It just happens that at this time we are actively discussing shell molding and, as you know, we ran an open press conference on June 20 to tear the lid off the secrecy. The AP as well as the other press services were among those who received our general release, and I have already had a few calls in response to your editorial note asking me for the facts.

Naturally, those who called are not the type of people given to the spreading of information until the accuracy is verified. I am a bit concerned, however, about the general readers who will be exposed to our advertisements and publicity at the same time they see your editorial remarks. If there is anything you can do to clarify the situation for your readers, it would be appreciated.

GEORGE BLACK
Public Relations Division
Cooper Alloy Foundry Co.
Hillside 5, N. J.

Editors Note: Mr. Black is discussing an item entitled, "Why Tear Down?" which appeared in the "With the Editors" column on page 10 of the July issue. None of the information contained in the newspaper dispatch criticized by FOUNDRY came from the Cooper Alloy Foundry Co. or Mr. Black. We regret exceedingly that anyone might have confused that article with the excellent releases on shell molding prepared by Cooper.

* * *

Council Closes Offices

TO THE EDITORS:

We are closing our offices as of July 11 and we reluctantly ask that our plate be taken out of your subscription list.

The council would like to express its appreciation of your co-operation in sending copies of your publication which has been of great help to us in our non-ferrous scrap metal recovery efforts.

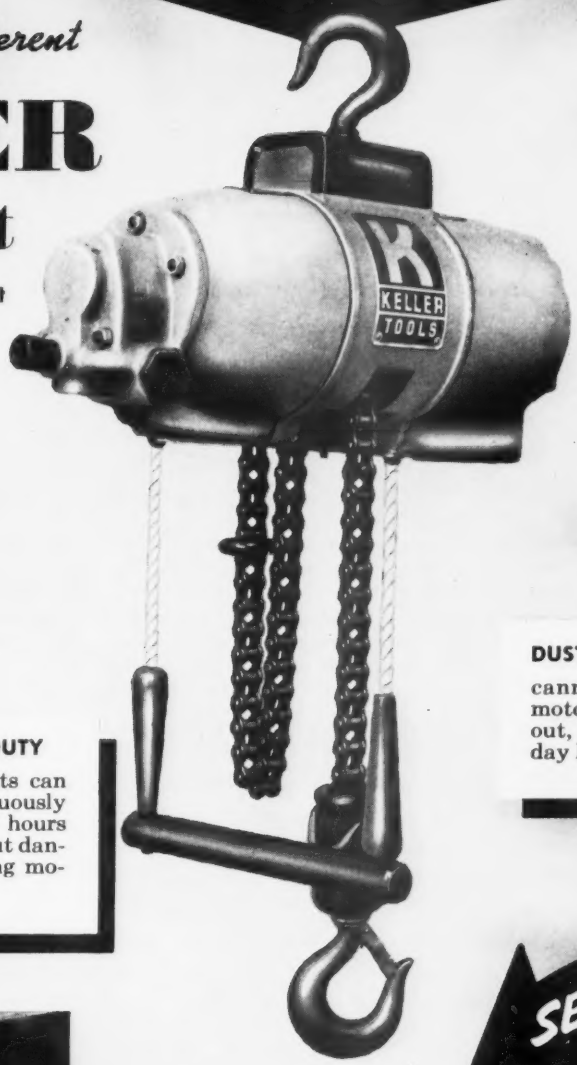
J. C. Blake, Director
Non-Ferrous Scrap Metal
Mobilization Council
New York

can't burn out *when stalled*

Sensationally Different

KELLER Air Hoist

with positive displacement piston-type air motors



VARIABLE SPEED

from 0 to 17 fpm permits safe handling of fragile loads. The load hook can be "inched" up or down for accurate spotting.

LIGHTWEIGHT

A 1,000-lb capacity hoist weighs only 30 lb —easy to carry up or down a ladder, and move from job to job.

LOW MAINTENANCE

because of simple design. Only a few working parts, and these are fully enclosed. Two grease fittings lubricate all working parts.

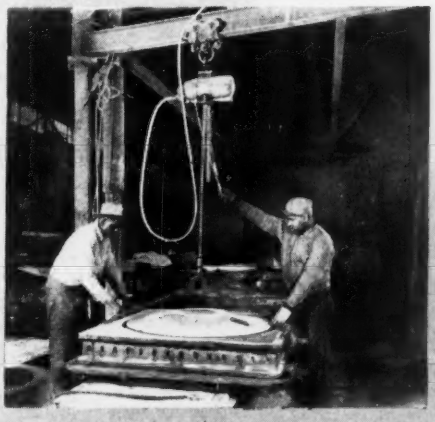
DUST, FUMES

cannot injure an air motor. Nor will it burn out, even if stalled all day long.

CONTINUOUS DUTY

Keller Air Hoists can be used continuously over periods of hours (or days) without danger of shortening motor life.

SEND FOR FULL INFORMATION



Finger-tip control enables the Keller Hoist to handle fragile loads safely.

KELLER TOOL CO., 4500 Race St., Grand Haven, Mich.

Please send me illustrated literature and prices of Keller Air Hoists.

Name_____

Title_____

Company_____

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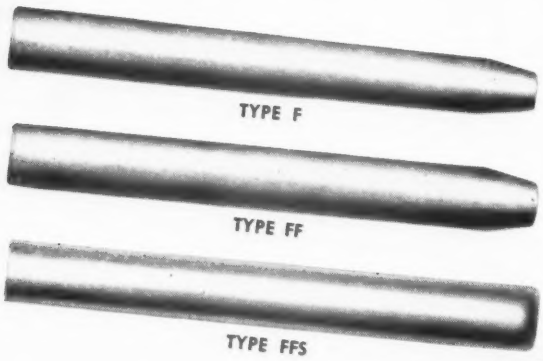
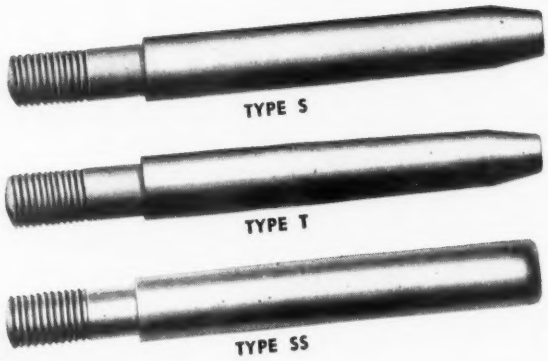
43 Years' Experience BUILDING FOUNDRY EQUIPMENT





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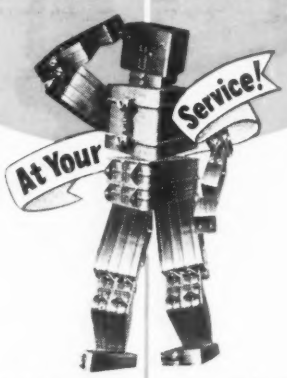
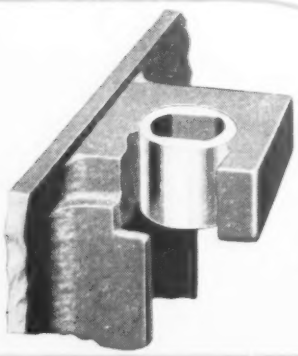
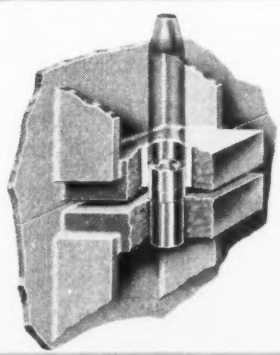




Hardened Steel Bushing as Installed in Flask.

Stub Pin in Drag Lug; Bushing in Cope Lug.



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A Contribution To Progress

SIXTY years ago this month, John A. Penton published the first issue of this business magazine in which he presented the following interesting editorial under the heading "Tardy Recognition."

At no period in the history of the foundry business in America have so many new foundries been completed as during the past twelve months, while many more are now in course of erection. There is one peculiar feature observable in nearly all instances—that while, a few years ago, any sort of a building, with rude and awkward appliances, was good enough for the foundry, it is now considered almost imperative to secure everything of the most modern description, foundries are planned to provide plenty of light and ventilation, every care being taken to ensure ease of handling and shipment of both the raw material and manufactured article, improved cupolas, electric cranes, the very latest thing in blowers, tumbling barrels, core ovens, etc., are all now considered necessary, while many establishments have gone a step farther, and provided commodious washrooms, closets, etc., fitted with all modern conveniences.

While this is only as it should be, yet to the thinking man it indicates several things. In the first place, the importance of the foundry business, and the fact that much skill is required for its successful management and to prevent waste is now conceded, a desire to make the shop as pleasant as possible to the molders and foundry help is apparent, with the view of increasing the output, and a knowledge born of experience seems to have suddenly made itself felt to the effect that makeshifts no longer pay, as in no other department of the iron industry can money be as readily saved in proportion to the capital needed as in the foundry by utilizing the latest improvements.

While tremendous progress has been made in foundry methods and production facilities since 1892, the fact remains that Editor Penton, in describing the modern foundry of that day, emphasized those factors which have guided developments in casting plants since that time. Well constructed buildings, good lighting, proper ventilation, the latest in equipment, and those extras which make for comfort of the employee continue to provide the basis for improvement of facilities to produce castings.

As the "modern" foundry described by Mr. Penton in his maiden editorial soon became obsolete and was superseded by the "modern" foundry of later years, so will our "modern" foundry of today be replaced tomorrow by more efficient plants designed to produce better castings at lower cost. Greater needs for castings, partly engendered by requirements of our national emergency and increasing difficulties in recruiting sufficient manpower, will speed this transformation.

As FOUNDRY marks 60 years of service to a basic industry, it takes considerable pride in the part it has played in this remarkable record of foundry progress. By searching out and publishing information on better machines, materials and methods, by crusading for improvements in facilities, practices and products, and by helping to build a pride in castings and their service to mankind, this publication has made a contribution to progress.

And as tomorrow follows tomorrow, and the production of castings moves forward, FOUNDRY will continue its service in helping to build a bigger and better foundry industry.

Frank G. Steinebach
Editor

FOUNDRY . . . WHEREVER METALS ARE CAST

Fig. 1—Section of molding floor, Gorham Mfg. Co.

Statuary to Electronics via

PLASTER MOLDING

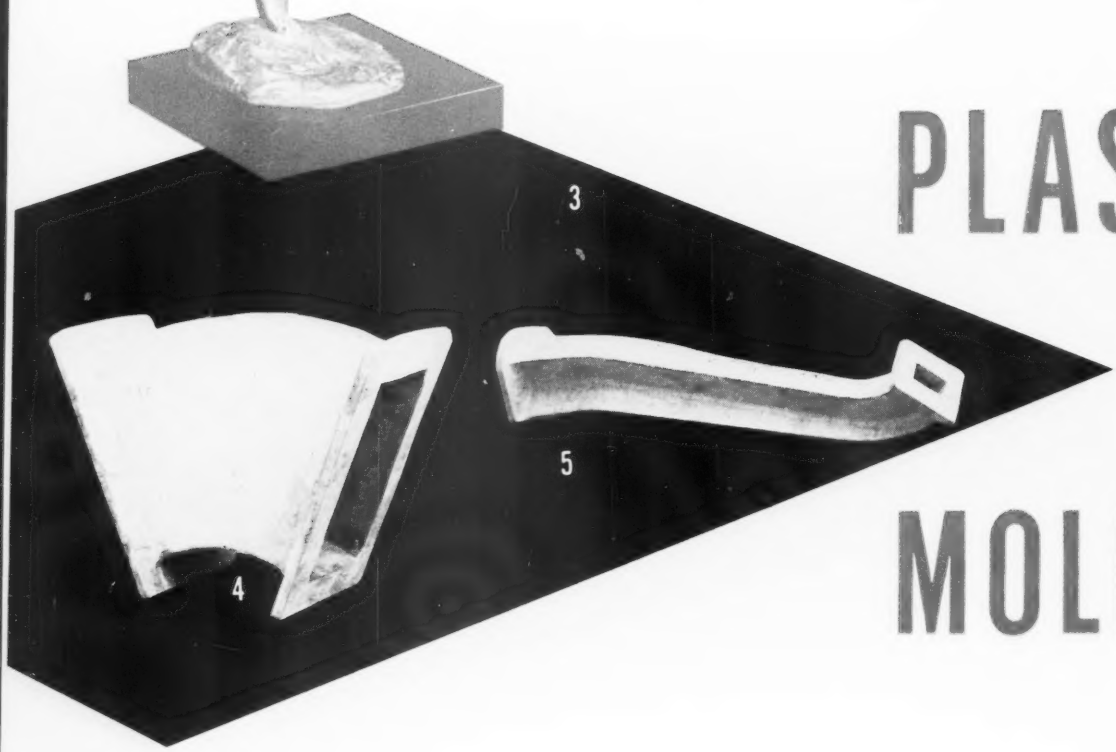


Fig. 3—"The Vine" © Harriet Frishmuth, Sc. Typical bronze statuary cast by the foundry

Fig. 4—Large 45 degree "H" bend, cast in brass

Fig. 5—Aluminum wave guide, 24 in. long with structural member cast integral

By FRANK PFISTER
Manager
Bronze Division, Gorham Mfg. Co.
Providence, R. I.

Fig. 2—Pouring plaster to complete mold

THE editorial published in the February issue of FOUNDRY pointed out that current trends in demand for castings closely approximated that of the early 1942 period when skilled foundry people were lost to the industry because of lack of orders through curtailment of civilian production.

The Gorham Mfg. Co., Providence, R. I., saw such a trend developing a year ago and, having gone through the 1942 period, decided to see what could be done to keep its skilled foundry people on foundry production.

The normal products of the Bronze Division, which includes a large statuary and memorial bronze foundry as well as a large fabricating shop, consists of fabricated electronic micro-wave components, slip ring assemblies, large and small statuary, markers, tablets and sundry memorial items.

While the bulk of the foundry production in normal times was done in green or French sand, there also existed a plaster casting foundry which had been in operation over fifty years doing the finer type of small statuary such as illustrated (Fig. 3). This type of work required the very best of foundry practice and skill, and it was accomplished by the plaster or gypsum mold method to the satisfaction of many noted sculptors the world over. The force normally used on this fine statuary was small though highly skilled and flexible enough to train and direct the activities of others as the need arose.

The fabricating section of the division, in its electronic experience dating from early 1941, ran into many difficult problems particularly in assemblies made of aluminum because of the narrow range of brazing materials then available with which to join a number of sections into one assembly.

When the problem of displacement of skilled foundry people appeared, it was thought something might be done to combine existing fabricating and plaster casting know-how and apply it to the production of electronic or other commercial castings, thus not only helping the fabricating problem, but also the foundry personnel problem.

It was decided to go ahead with the plaster casting development. One happy result has been that not a single foundryman has been lost because of curtailment of civilian orders. It has, in fact, been necessary to increase substantially the foundry working force.

There were some misgivings relative to the adaptability of sand foundrymen to plaster work. These fears were soon allayed when the sand molder's natural ingenuity demonstrated his ability to cope with most foundry problems if given an opportunity.

The progression from statuary to waveguide components was not simple—due not only to the complexity of the new work, but also because the fine surface normally required on the outside of statuary was now necessary on the interior of waveguides. Sizes and tolerances which are less demanding in statuary became a factor of major importance in that waveguide tolerances in the order of $\pm .005$ are the rule rather than the exception.

Change in Habits and Thinking

It was necessary for both supervisors and molders to change completely their work habits and thinking to accomplish the successful production of the plaster cast work being done. The fact that results have been good clearly demonstrates that something can be done to alleviate the displacement of skilled foundrymen.

Experience with fabrication of electronic parts dictated the decision to concentrate on the production of aluminum parts by the plaster molding process, although many are also being made in brass and bronze. It was necessary that the aluminum alloys used should possess high strength, good machinability, sound metal structure and good corrosion resistance. The elimination of distortion from heat treatment was also given consideration.

The solid solution alloys such as Ternalloy (Apex Smelting Co.) and Tenzalloy (Federated Metals Division) were found to measure up to the requirements in that they are of the age-hardening type and can be both welded and brazed with no effect on strength as a result of the heat used in the joining method. Machinability is excellent and the grain structure is fine, thus providing an excellent base for polishing or buffing when needed. Alloys such as 356, 43, 195 and others are also used where specifications do not permit substitution. These alloys cast well in plaster but, of course, are either difficult or impossible to braze and require heat treatment for maximum strength in the case of the heat-treatable alloys.

The casting in plaster of solid solution alloys and others, for that matter, requires special attention to gating, feeding, etc., because the mold material is an excellent insulator, causing the casting to have a much slower rate of solidification than if cast in sand. Also, the permeability of plaster is very low; there-

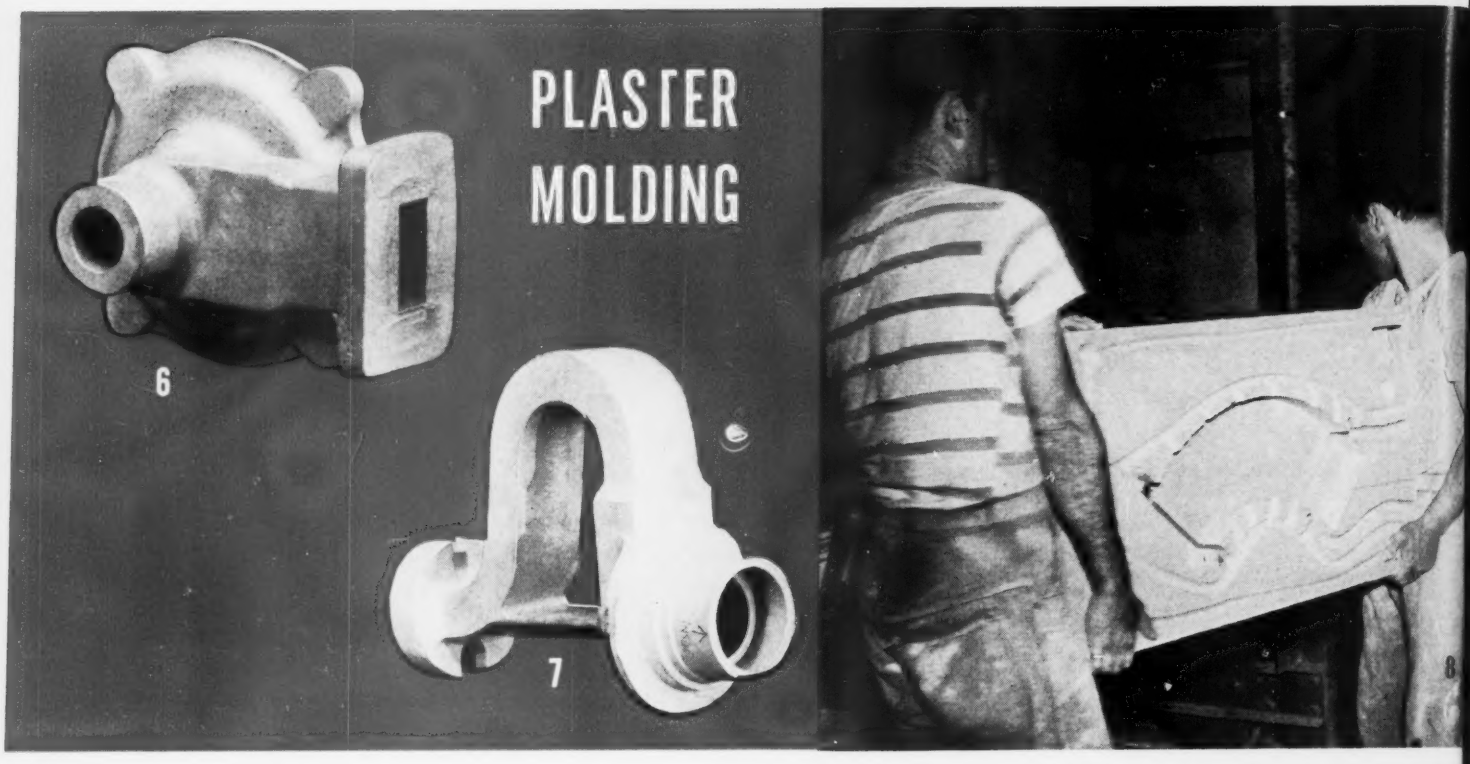


Fig. 6—Aluminum transition flange, 7 in. long and 5 in. diameter

Fig. 7—Aluminum coupler bend, 8 in. long

Fig. 8—Loading the mold drying oven

fore it is essential that all precautions possible be taken to provide adequate venting for the free passage of gases which may be in the metal or generated within the mold at pouring.

The electronic type of casting presents many problems in successful production because of the abrupt changes in section, going from very thick to very thin, also in that dimensions and surfaces on the inside of the waveguide are critical.

The bulk of such work at present is designed on the basis of mechanical assembly, and considerable co-ordination is required between the foundry and design engineers to make full use of the many advantages of plaster mold casting.

The use of chills and other cooling methods is considerably more extensive than that used in sand to take care of abrupt section changes, and to overcome the high insulating qualities of the plaster mold material.

Metal pouring temperatures are very critical and require close control. The typical pouring range is between 1275 and 1375°F; however, each casting has its own best pouring temperature whether in sand or plaster, but pin pointing the proper pouring temperature is paramount when using the plaster process.

Melting the alloys is much the same as in sand, with dry nitrogen or chlorine being used extensively for degassing purposes.

Patterns and coreboxes used at the Gorham foundry are largely made of metal. Other materials can be used, but the accuracy required in the end product calls for the very best pattern and corebox equipment.

The cost of plaster molding metal pattern equipment is generally higher than similar equipment required for sand casting. This can be attributed largely to the closer tolerances required, and also to the fact that draft is not permissible on the inside of a waveguide section nor, in many cases, on the outside of the part. This means that the patterns must be engineered to accomplish drawing the cores and patterns without the benefit of draft which usually results in equipment much more complicated than ordinarily made.

Many varieties of mixes are being used for making plaster cores and molds. The ultimate aim is to accomplish the greatest possible permeability and heat conductivity. Toward this end, sand, asbestos fibers, cement and many other ingredients are being added in various proportions to the plaster during the mixing operation. Metal casting plaster (U. S. Gypsum Co.), a combination of ingredients especially blended for metal casting in plaster, is producing good results when instructions of the manufacturer are followed. Generally, it is best for each foundry attempting this type of casting to work out its own combinations and ratios of plaster to water to suit prevailing shop conditions with respect to molding, drying, nature of the work being done, etc.

Basically, 10 parts of metal casting plaster to 16 parts of water would be a starting point. All ingredients should be carefully weighed, and the water used is more effective at a temperature of 120°F. Mixing can be done either by hand or with power equipment. Usually a round-bottom vessel similar to that used by bakers for mixing dough works well for plaster. The dry mix is always added to the water and allowed to soak for approximately one to three minutes, after which a thorough mixing either

Fig. 9—Drawing metal pattern from plaster mold

by hand or mechanical means should take place immediately. Mixing should continue until the plaster acquires a creamy consistency, which is usually approximately one to three minutes mechanically, or three to five minutes by hand.

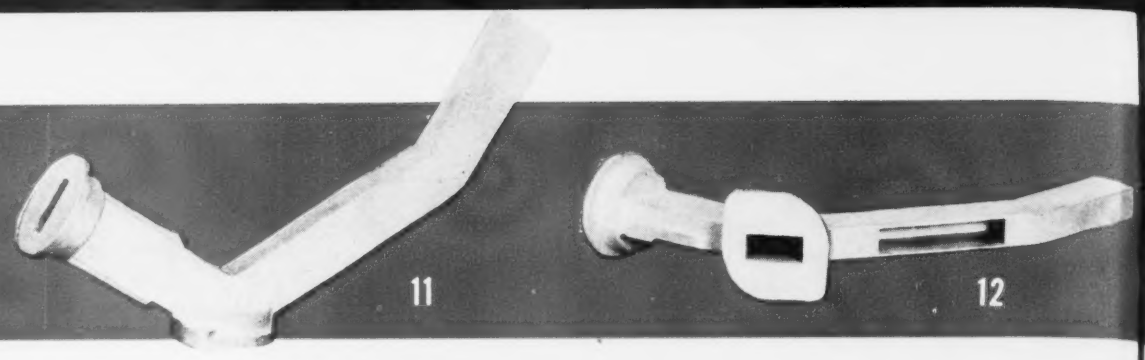
Pouring into coreboxes or molds should take place immediately after mixing as the setting-up time of the plaster is usually about 15 to 20 minutes.

Cleanliness of the equipment for proper reproduction and smoothness of surface, and a parting agent to prevent the sticking of the mix to pattern surfaces, are of major importance.

Among the many parting agents, stearine appears to be the one most widely used. This material is prepared for use by melting down the stearine; then, after removal from source of heat, add kerosene. Proportions commonly used are ¼-lb of stearine to one pint of kerosene. This material is brushed thoroughly over the pattern surface. If brush marks show, the consistency is too heavy and dilution can be obtained either by adding kerosene or by warming slightly.

The removal of the plaster part from the corebox or the pattern (Fig. 9) requires extreme care to avoid marking or breakage. Patience and experience are

Fig. 10—Section of the drying ovens, showing molds



Figs. 11-12—Two views of an aluminum wave guide, 15 in. long

Fig. 15—Pouring molten metal into plaster molds

necessary to break the suction created during the setting process. The common methods of accomplishing this are through the use of gently wedging or prying the various pattern or corebox sections apart and through the use of compressed air, or a combination of both. Vibrating also is helpful at times, but care is essential in its use.

Cutting the gates and runners, the usual mold cleanup and preparation for casting are done immediately after removal of the set plaster and prior to drying. The plaster works well in this condition, and conventional tools are used.

It is helpful to allow the wet mold to air dry before placing it in the drying oven (Fig. 8). The length of air drying time depends on the nature of the part; however, 8 to 24 hours is the range being used.

One of the most important operations in the successful production of plaster mold casting is that of drying the mold. Complete dehydration is necessary to avoid generating gas causing blows, etc. in the casting when poured. If the drying operation is slighted at all, trouble can most certainly be expected.

Many methods of drying can be successfully used, depending upon the nature of the work involved; however, all contain the same essentials, namely, a means of removing the moisture in the molds through circulation and a heat medium. The system used at the Gorham foundry consists of a series of specially built brick ovens with a combination recirculating and exhaust blower system, using oil as a heating medium. This system was chosen because the castings produced are generally short-run as opposed to high-volume production; also, sizes and shapes are of such extreme variety that maximum flexibility is

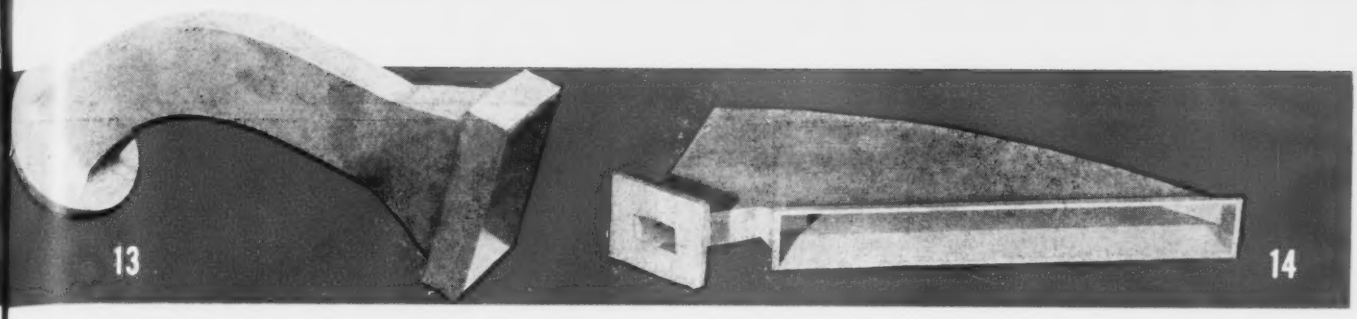


Fig. 13—Aluminum antenna feed, 14 in. long

Fig. 14—Aluminum antenna feed, 10 x 15 in.

Fig. 16—Removing plaster core from metal corebox

necessary to accommodate the various mold sizes involved.

Electronic controls are extensively used to minimize, insofar as possible, the difficulties resulting from improperly dried molds. Oven temperature is controlled thermostatically at 800°F during the drying cycle, which may run a range of 16 to 36 hours, depending on the nature of the work load. The drying cycle is controlled through the use of thermocouples placed at strategic locations within the oven.

After drying, the molds are set up for pouring in much the same manner as dry sand molds, that the lapse of time between the removal of the mold from the oven and pouring should be as short as possible. The ever-present possibility of picking up moisture is likely to be the result of slow handling at this stage of production.

As mentioned previously, melting and pouring in the plaster molding process is much the same as in sand casting.

The use of the plaster molding process is proving not only very effective in the production of electronic parts but in others also where good surfaces, thin sections and close tolerances are required. Good results are being attained in brass and bronze as well as aluminum.

The original cost of castings made through the plaster process is generally higher than that by the sand process, because of the many factors involved, but the end cost should be lower when all factors are weighed.

The accompanying photographs show various phases of the plaster molding operation and illustrate the type of castings being produced by this method.

Facility and operational photographs reproduced in Figs. 1, 2, 8, 9, 10, 15 and 16 are by courtesy of E. M. Tyler.

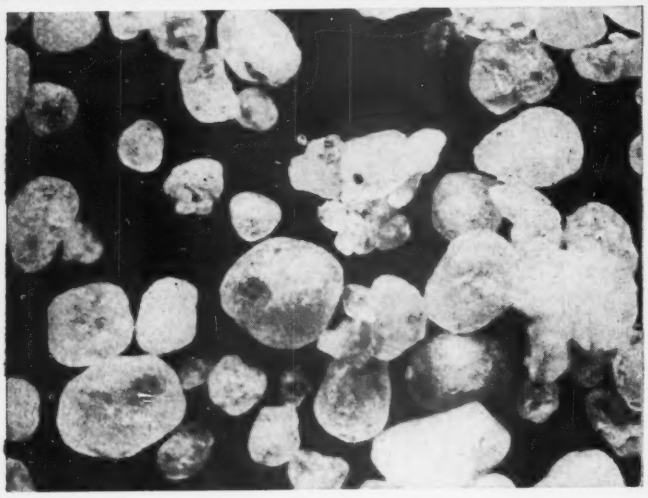


Fig. 1—New Dorchester sand, crude state. Original luster of the grains is shown

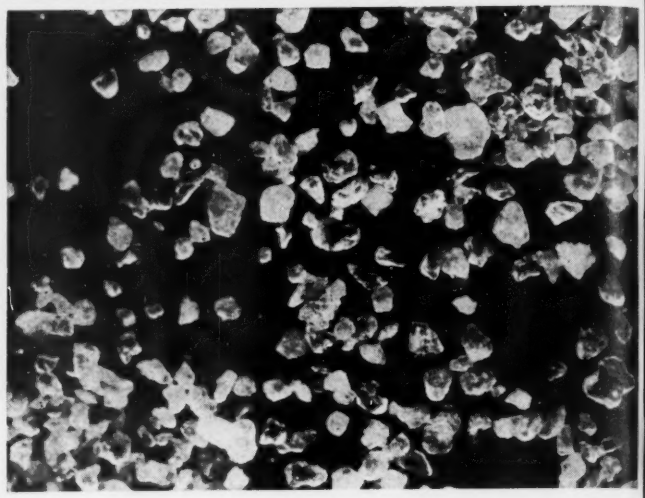


Fig. 2—New grade "C" sand is washed and classified before delivery to the foundry

Sand Reclamation

at the Eddystone Plant

STEEL foundry operations always have been characterized by large scale handling of sand. Since 1 to 2 tons of new sand per ton of castings normally are required in foundries producing large steel castings, the purchase, handling and storage of sand becomes an important cost item, and every effort must be exerted to maintain as low a ratio of new sand per ton of castings as possible, consistent with good results.

In any foundry operation an amount of used sand equal to new sand introduced into the system must be disposed of as refuse sand. Such a practice is wasteful and is becoming an increasingly costly operation, especially when local fill areas become exhausted and off-site locations for dumping become necessary. Handling costs then rise sharply, particularly if rail facilities are involved.

In many locations large quantities of new sand must be stored for use during winter months when sand production may be curtailed. In some instances sufficient storage for the total sand requirements for these months must be provided. New sand costs are increased at the pits in the winter months, and unloading costs are increased greatly if sand arrives at the foundry tightly frozen in cars.

Purchase of new sand in quantity is an important cost item even though the sand is relatively cheap at the point of origin. Transportation and handling costs frequently exceed cost of sand. Therefore, reduction in use of new sand is desirable for economical foundry operation. A marked reduction in the use of new sand can be accomplished best by reclamation of used sand. Cost of reclamation will determine amount of savings that can be realized.

Deterioration of Sands in Use—Studies in the Eddystone laboratory of General Steel Castings and at the University of Kentucky on the SFSA Research Project have shown that after being compounded into mold and core sand mixes and after being in contact with molten steel, the sands do not become basically altered or changed, but do have different properties as a result of altered or changed surface characteristics. Sands in molds and cores below the actual contact area also are affected by increase in temperature. Decomposition, distillation, condensation and charring reactions occur in varying degrees among cereal binders, lignins, starches, resins and oils which change surface condition of sand grains materially.

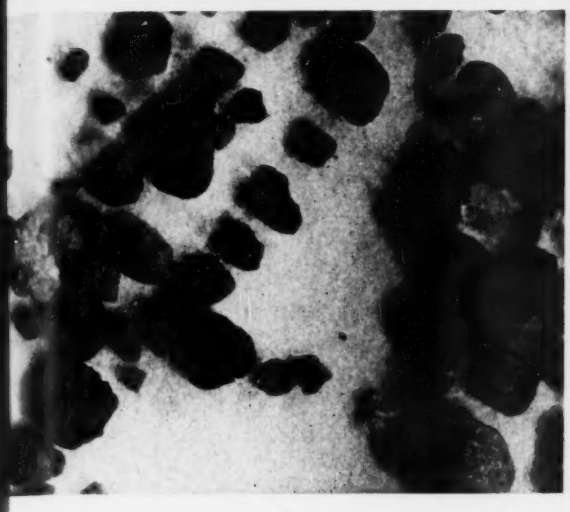


Fig. 3—Prior to cleaning, used sand is coated with clay and carbonaceous matter

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This change in properties of compounded sands is sufficient to make it undesirable to re-use this sand on the mold and core face of subsequent molds in contact with the molten steel.

One of the most important effects resulting from contact of the compounded mold or core sand with molten steel is the coating of sand grains with a firmly adhering film of clay binder and carbonaceous matter. At the temperature of molten steel, water of crystallization of clay compounds is driven off, and clay or bentonite film on the grains has distinctly different properties from the original binder. Carbonaceous matter results from decomposition of organic compounds present in the mix.

If molding sands which have been exposed to molten steel are re-used, bonding with clays or oil is less effective. The coating on sand grains also becomes a cumulative effect if sand is further re-used, the sand therefore becoming progressively poorer in quality for use in mold or core facings.

These sands also are contaminated with metallic iron and iron oxides as a result of contact with molten steel and with cleaning of the castings. Further contamination results from silica flour and clays used as binders. All of these foreign materials lower the permeability of the sand mix, a condition which in turn hinders escape of mold gases. These materials also may form low-melting-point compounds which lower the sintering point of the sand mixture and thus contribute to "burnt-on" sand and metal penetration. Presence of these materials also may affect the workability of sand adversely to the extent that improper ramming results, with its attendant evils of scabs, drops and buckles.

A comparison of new sands in Figs. 1 and 2 with the coated grains of used sand in Fig. 3 shows the vast difference between surface conditions of new and used sand grains. One can easily understand why the re-use of the sand as shown in Fig. 3 would offer difficulties when compounded in the same way as the sand shown in Figs. 1 and 2.

However the sand grains, which are principally quartz, suffer little change when used, except for the coating phenomena previously mentioned. Therefore any treatment which will remove the coating completely from the grain will restore them to their former usefulness. Such a treated sand becomes the equivalent of new sand in every respect.

Methods of Reclamation—There are several systems of reclamation possible: (1) dry reclamation, (2) wet reclamation, (3) thermal reclamation and (4) a combination of wet and thermal reclamation.

Dry reclamation consists of removal of fines such as silica flour and clays by air separation. A certain degree of classification is accomplished either by screens or by air separation. Dry reclamation has little effect on the coating on the grains, since this film is tenacious and a pronounced scouring or scrubbing action is required to free the grains from the coating. The removal of the fines increases the permeability of the sand and may raise the sintering point, but fundamentally the used sand has not been restored to the quality of new sand.

The wet method of reclamation consists of mixing the sand with water with a mechanical scrubbing action. A considerable portion of the coating on the sand grains may be removed, depending upon the efficiency of the scrubbing. The wet scrubbing is effective in the removal of clay films, but is not totally effective in the removal of the carbonaceous matter. The product of wet reclamation usually has a gray appearance, some grains possessing a luster and others a dull appearance showing some coating.

The thermal method of reclamation consists of heating the used sand at temperatures of 1200 to 1500° F. This treatment completely removes the carbonaceous matter. Part of the clay coating may be removed by the abrasive action in the roasting furnace. The ef-

Table I—Screen Analyses and Equivalent Reclaimed Products of South Jersey Sands

	DORCHESTER SAND		GRADE "C" SAND	
Screen No	Purchased	Reclaimed	Purchased	Reclaimed
6	...	...	...	...
12	0.2	0.4	...	...
20	6.6	8.4	Tr	Tr
30	21.4	22.2	0.2	0.8
40	25.6	25.8	1.8	6.4
50	25.8	25.6	13.2	18.6
70	14.2	14.4	38.8	36.8
100	4.4	2.8	35.6	30.8
140	0.8	0.2	8.2	5.4
200	0.2	Tr	1.2	0.6
270	Tr	Tr	0.4	0.4
Pan	Tr	Tr	0.4	0.2
Total	99.2	99.8	99.8	100.0
AFS Clay	1.0		0.2	

ficiency of the removal of the clay coating is dependent upon the type of clay used in the sand mixes and the scrubbing action received in the heating unit. Western bentonite films are more readily removed than fire-clay films. In general, however, the sand grains are not cleaned completely, and erratic results may be obtained, especially if fire clay is used. Fig. 5 shows a fire-clay bonded sand which was given a thermal treatment; the grains still retain some coating.

Since wet-scrubbing is effective in the removal of the clay films and thermal treatment removes the carbonaceous matter, a combination of the two methods should produce excellent results. Fig. 6 shows a fire-clay-bonded sand which was treated by wet-scrubbing and heating. The grains possess their original luster and are free from practically all of the coating. This sand has been restored so that it is equivalent to new sand. Sands which have been reclaimed by this method will show a reddish-yellow hue because of a slight iron stain which has no harmful effects.

The Eddystone plant produces a range of castings which vary in size and weight from lightweight railroad specialties to the heaviest of miscellaneous castings. Consequently, all types of molding media, such as green sand, dry sand and all-core molds are used. The approach to the reclamation problem, therefore, was to produce a product which could be used interchangeably with new sand for both core and mold facings.

After extensive laboratory experiments, the combined wet and thermal process was adopted as offering the best possibility for meeting our requirements. It is effective in removing the coatings which result from the use of inorganic and organic binders. This is an important consideration since a trend is developing in the industry to the use of various resin binders which in many instances are not water-soluble.

Comparison of New and Reclaimed Sands — Sand used at Eddystone comes from South Jersey pits. Two grades are purchased in approximately equal quantities, Dorchester grade, which is a crude sand, and grade "C" which is washed and classified at the source. Typical screen analyses of these sands and the equivalent reclaimed products are given in Table 1.

Since sands of two different grain sizes are used in about equal quantity, a further requirement for the reclamation process is that reclaimed sand be separated into two portions of grain size and grain distribution similar to that of the two new sands purchased. The physical setup of Eddystone's sand storage bins and sand-handling equipment make it mandatory that the new Dorchester sand and the reclaimed sand corresponding to this grade be stored in the same bin. Likewise, the new grade "C" washed sand and the reclaimed sand corresponding to this grade must be stored together.

Fig. 4 shows grain-distribution curves of the two purchased sands and the reclaimed sand, separated into the two equivalent grain sizes. The curves on the left are the Dorchester sand and its equivalent reclaimed-sand portion, the curves on the right, the grade "C" washed sand and the equivalent reclaimed-sand portion. These curves indicate that the reclaimed sands can be stored indiscriminately with the new sands and used interchangeably in our sand formulation. This has been demonstrated by the Eddystone plant operation, which has been on this basis since the reclaiming plant was put in operation in 1948.

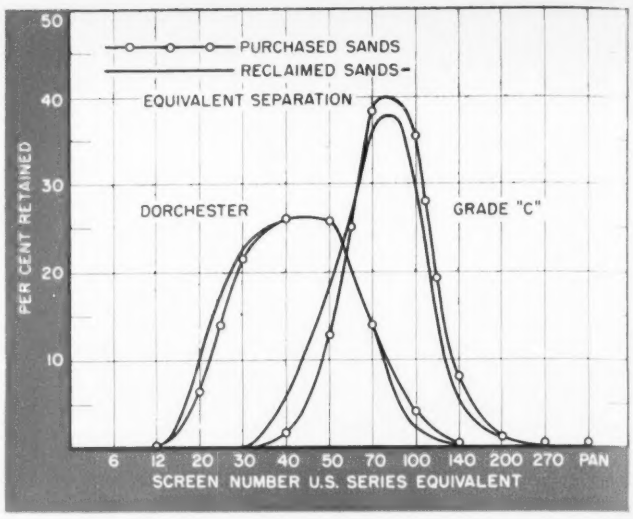


Fig. 4—Grain distribution curves of the two new sands and of the reclaimed sands

Description of the Plant—The plant was designed for 100 net tons daily output and when operated continuously 7 days per week has a capacity of 3000 net tons per month. In service, the plant has operated at the rate of 110 to 115 tons per day for extended periods.

Work was started in 1947, and the plant was put in operation in November, 1948.

Cost of the complete installation, including necessary building, was $130,675.20. It is housed in an L-shaped steel building with a floor area of 2500 sq ft.

All equipment used in this installation is standard and has been used in the mining and allied industries for many years. Service characteristics and operating results were so well known that the hazards usually associated with new or experimental plants of this type were minimized greatly.

Flow of the sand through the plant is shown in the schematic flow-sheet diagram in Fig. 7. The sand is received from the foundry by a belt conveyor, which discharges on a scalping screen to remove oversize material and refuse such as paper, wood chips, asbestos, packing, lumps, etc. from the sand. The storage bin is provided for Saturday and Sunday operation of the reclaiming plant since the foundry operates on only a 5-day schedule. This bin has a capacity of 250 tons, which is sufficient for 2 days' operation. It has a hopper bottom over a 24-in. pan conveyor which runs the full length to feed the sand. Rate of feed is governed by an adjustable gate at the discharge end and by speed of the pan.

The pan feeder discharges into a Denver agitator, where sufficient water is added to make a concentration of about 50 per cent solids. These agitators are 5 ft in diam by 5 ft high and, in the center, have a vertical pipe extending downward two-thirds of the height of the tank. Below the bottom of the pipe is

a three-bladed propeller 15 in. in diam which is driven by a vertical shaft. The sand and the water are fed into the pipe; the discharge from the agitator is near the top of the outer shell. The circulation is quite rapid, and the sand receives a thorough scrubbing by impinging on a wear plate beneath the propeller.

Sand and water from the agitator are pumped by a Wilfley pump into an Allen cone overhead. This is a conical tank 7 ft 2 in. in diam by 7 ft 9 in. high, provided with a float-controlled discharge valve in the bottom. As the sand settles, it is discharged from the bottom, while the sludge and dirty water overflow a circular weir at the top. Use of the cone at this point relieves the system of a large amount of sludge after the initial scrubbing and results in more efficient functioning of subsequent operations.

Discharge from the cone is into a second agitator, where clean water is added to bring the concentration to 50 per cent solids. There the sand receives a second scrubbing.

The Dorr rake classifier receives the sand and water from the second Denver agitator. It is type DSFR, 3 ft wide by 21 ft 8 in. long, with a 20 ft deck extension and deep pusher. The trough of the classifier is set on a slope of 2½ in. per ft and receives the sand and water at the lower end. Action of the pushers, which operate at 18 strokes per minute, moves the sand up the incline by their reciprocating motion. Clean water in volume is introduced about midway of the incline section of the classifier to "back wash" the sand. Function of the classifier is to separate the remaining sludge and fines from the sand and to some extent to dewater it. The sand is discharged with 18 to 20 per cent water content at the upper end of the classifier into an elevator which conveys the sand to the top of the furnace.

The Nichols furnace is a wedge multiple hearth having seven hearths with an area of 881 sq ft. Outside diam of the steel shell of the furnace is 16 ft 9 in. and has a brick lining 13½ in. thick which consists of 4½ in. of firebrick and 9 in. insulation. Sand enters the center of the top hearth, and its movement through the furnace is accomplished by a rotating center shaft attached to which are two rabble arms for each hearth. Mounted on each rabble are several plows equally spaced and set at such an angle that as they move through the sand they plow it inwardly on one hearth and outwardly on the next lower hearth. Top hearths remove the moisture from the sand, center hearths burn combustible material from sand grains, and bottom hearths cool the sand. Center hearths operate at a temperature of 1350-1450°F, and sand is discharged from the furnace at approximately 900° F. The furnace is fired with bunker C oil, using six No. 782 Hauck proportioning-type oil burners. Burners are located on the third and fifth hearths.

A horizontally revolving barrel set at a slight angle toward the discharge end receives the hot sand from the Nichols furnace. This barrel is 5 ft in diam by 14 ft 9 in. long and re- (*Please turn to page* 272)

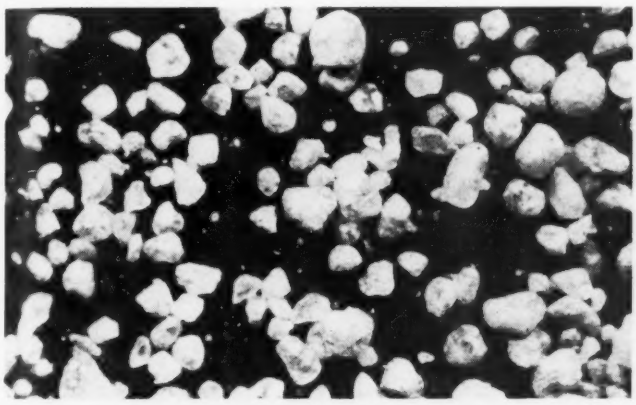
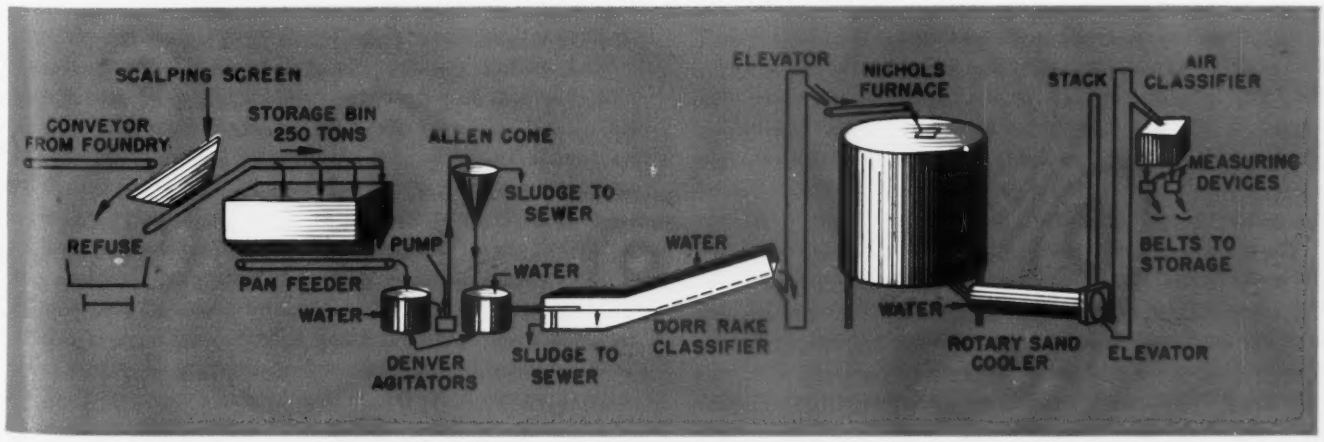


Fig. 5—Fire-clay bonded sand still has some coating following thermal treatment

Fig. 6—Wet-scrubbing and heating renews fire-clay bonded sand to original luster

Fig. 7—Flow of sand through the plant is shown in this schematic flow-sheet diagram



CORE

serves as

Gate and Riser

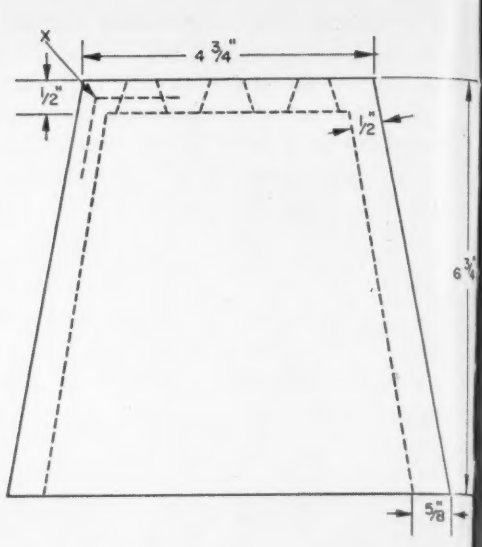


Fig. 1—To add strength and prev breakout, the bottom of a large co is reinforced with thin steel stra bent at an angle as shown in Fig.

By BEN F. SWEET
Superintendent
Morse Chain Co., Ithaca, N. Y.

A VARIATION of the knockoff riser shown in the accompanying illustrations was developed primarily for use on blank gears and sprocket wheels. It has worked equally well on practically all castings regardless of design or size. This particular type of riser also serves as pouring sprue and gate, and as an effective choke. It can be used on floor, bench, jolt-rollover, jolt-squeeze or any other type of molding operation.

The simple core is rammed in the cope on any flat spot or adjacent to any heavy section or sections. Figs. 1, 2 and 4 show one of the simpler adaptations of the gate-riser core, which may be used with or without a center core as circumstances dictate. This adaptability is illustrated in Fig. 2. The center hole insert is interchangeable for any size from the standard 7/16-in. tapered to 7/8-in. up to the 2¼-in. tapered core print for center core, for use on wheel hubs. The top vent on the center core is stopped, and the vent is taken through the drag. We use 1, 1¼, 1½, 1¾, 2 and 2¼ in. When larger cored holes are required, the regular center insert is used. The gate-riser core is set to one side, and one or two holes are enlarged to compensate for the holes positioned over the center core.

The rammed sand around the gate-riser core should be well vented to facilitate passage of the gas from the core. If a center core is present, the top of the vent should be stopped to prevent bubbling in the riser. Gas from the center core will pass off through the drag. On heavy castings, the large center core may be extended through and above the "hot top" core to insure easy exit for the gas. The center core may be weighted or clamped down to prevent it from floating, as shown at *Y* Fig. 4.

The core shown in Fig. 4 is used on castings up to about 600 lb. This core has four gate openings tapered from 7/8 to 7/16 in. and holds 25 lb of feed metal. This small amount is sufficient if a mildly exothermic powder is sprinkled on the surface and if the riser is *touched up*. With this type of gate-feeder, chipping and grinding operations are reduced to a minimum, and ratio of casting yield to metal melted is increased appreciably. A 3/8-in. wood or metal peg centered on the hub or elsewhere locates the gate-riser core and prevents it from shifting during the ramming operation. A flanged wood cover is placed on top of the core to prevent it from being filled with sand. If more than 25 lb of metal is required, the riser height may be increased by ramming sand around a standard riser block in a small drag.

The following core sand mixture imparts exceptional green and dry strength in the thin wall cores: 80 qt washed and dried silica sand, 9 qt core oil, 14 qt cereal binder and 6 qt water. Mulling time is five minutes maximum. In extreme cases a zirconite sand mix is used in the bottom of the cores. The bottom of large cores is reinforced with steel straps bent at an angle as shown at *X*, Fig. 2. These straps strengthen the bottom while the core is green and prevent a breakout when it is filled with metal. Scrap from punch press operations serves satisfactorily and is inexpensive.

Some of the large cores are oval instead of circular

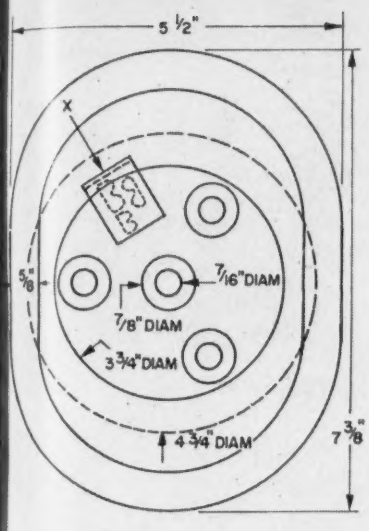


Fig. 2—Some larger cores are oval, not circular, to fit between bars of cope

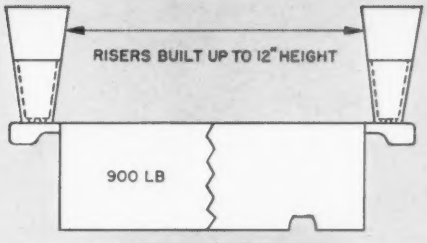


Fig. 3—Gate risers on this 900-lb die block were built up to a height of 12 in. to hold about 50 lb each

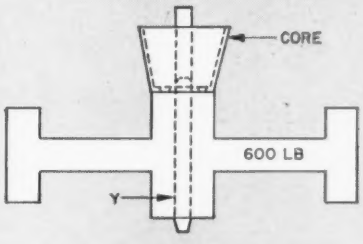


Fig. 4—This core is used on castings of up to about 600 lb and holds approximately 25 lb of feed metal

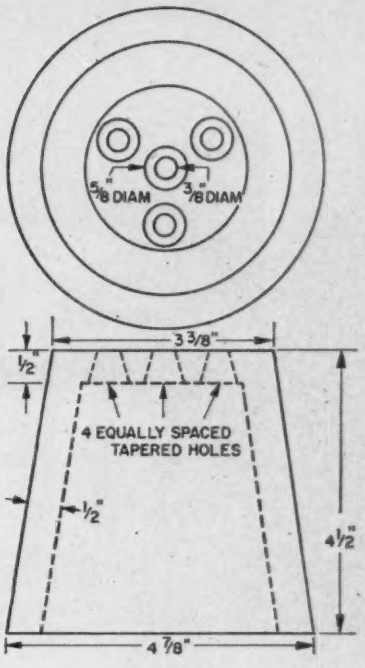


Fig. 5—One of smaller cores holds about 10 lb of feed metal and has proved very effective in bench work

to fit between the bars in the cope. Where the cope bars permit, round cores are used. Obviously a round corebox is easier and cheaper to make than an oval corebox. When only a shallow cope is available for a heavy casting, much less molding time is consumed building up one area for the gate-riser combination than for the usual riser *and* runner box.

To facilitate pouring the metal into the gate-riser at or near the center of a large cope, an extension pouring lip should be welded on the conventional ladle lip. This will eliminate the necessity of raising the ladle high enough to clear the flask side. The lip extension should be attached at a steep angle to prevent iron from remaining on the lip and dribbling while moving from mold to mold. It also enables the ladle operator to prevent overflow.

When the core extends above the top of the cope on a mold for a heavy casting made on a jolt squeezer, a hole is cut in the squeezer board to allow the core to pass through. Usually it is necessary to use higher cleats on the board to prevent crushing the core against the squeeze head of the machine. Up to 200 lb castings have been made in 19-in.-diam special flasks on squeezer machines with this gate-riser method. Usual weights and jackets will not withstand the strain. In the instance cited a light weight is used. The center is cut out to accommodate the gate core. Two bent flat steel stock clamps embrace the top of the weight and the bottom of the bottom board. Wood wedges pushed in by hand tighten the clamps. No difficulty has been experienced with swells or run-outs.

On large rollover flasks, where the core extends above the top of the cope, it will be necessary to cut a clearance hole in the rollover board similar to that in the squeezer board on the molding machine. If a large center core is present in a fairly small hub, the gate-riser core can be placed off center on the hub and only one enlarged hole used for pouring and feeding. The cope core print is omitted, and the center core is cut flush with the top of the hub. The gate core holds the center core firmly in place.

A 900-lb die block, a source of some trouble in the past, was made with two cores as shown in Fig. 3. The cores were rammed on wood drag bobs, one on each side, connected to the casting by an opening 1 x 2 in. The arrangement is shown in Fig. 3. The gate-risers were built up to a height of 12 in., designed to hold about 50 lb of metal each. With this method it is apparent that the last and hottest metal is poured into the riser where it will do the most good. Chipping and grinding is held to a minimum, and the casting yield is high.

When melting and pouring low-carbon (3.00 per cent), low-silicon (1.25 per cent) iron, it is sometimes necessary either to enlarge the feeding holes or to build up the riser somewhat higher than one would for a softer grade of iron.

The cores may be rammed by hand, jolted on a machine, or made on a core blower. In particularly difficult instances, vent wax is incorporated on the core bottoms to facilitate escape of gas. Short pieces of vent wax are laid in the sand radiating outward from the center. (*Please turn to page* 236)

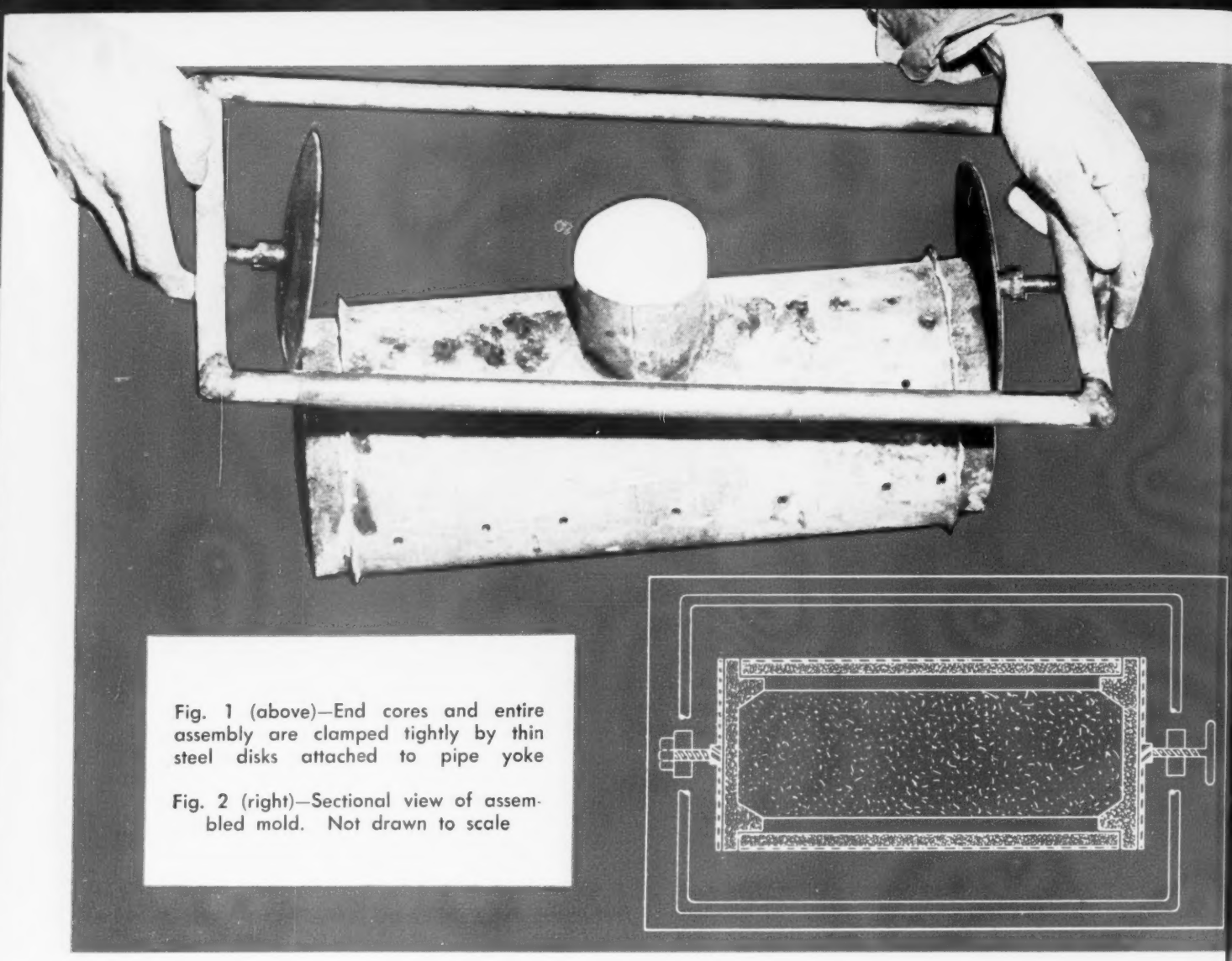


Fig. 1 (above)—End cores and entire assembly are clamped tightly by thin steel disks attached to pipe yoke

Fig. 2 (right)—Sectional view of assembled mold. Not drawn to scale

DEVELOPS NEW PROCESS FOR CASTING STOCK

DIFFICULTY in securing skilled foundry help prompted M. L. Hart, proprietor of a machine shop and foundry in Oklahoma City, Okla., to develop a new method and equipment for producing bushing stock castings. These castings are claimed to be superior in many respects to long-established conventional methods and equipment used where the molds are made in green sand and poured either in a horizontal or vertical position. In the method shown in the accompanying illustrations, the molds are formed in a vertical position and then filled with metal while in a horizontal position.

The mold is a light metal cylinder 18 in. long, open at both ends and provided with numerous ¼-in. vent holes. Number of cylinders and their diameters depend on the number and size of the bushings to be produced. Each cylinder is lined with core sand approximately 1 in. thick. In the present instance the bushing patterns increase by ¼-in. increments up to 8 in. OD. Obviously, any cylinder casing, by slightly changing the thickness of the sand lining, will serve for castings in a definite diameter range.

The molds are dried in an oven, then removed and assembled on a temporary bench, as shown in Fig. 1.

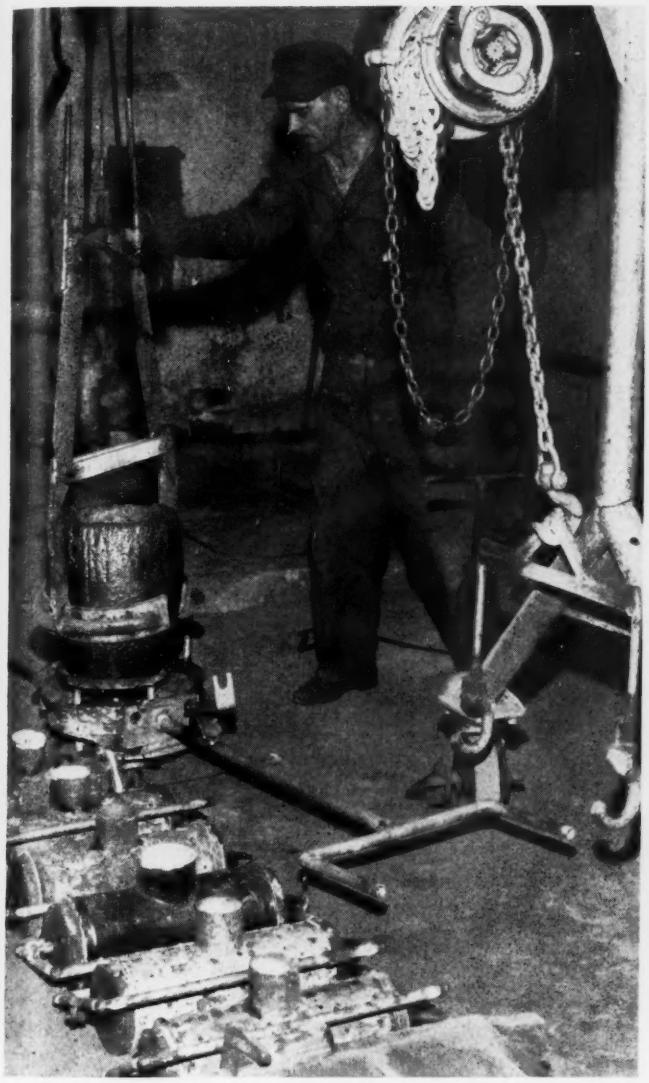


Fig. 3—Metal from crucible is poured into small sand-lined cup on top center of horizontal mold

Fig. 4—A driving gear of the type used on bicycles moves the pattern up and down satisfactorily

K BUSHINGS

By J. GILBERT HILL

or on the floor as shown in Fig. 3. The center core is located and held in place by a small ring core at each end. These ring cores fit tightly inside the sand lining in the casing. The entire assembly is anchored inside a rectangular yoke made up of four pieces of 1-in. steel pipe welded at the corners. A disk attachment at each end engages the end core and is tightened by turning a bolt in a small housing attached to the under side of the end pipe. Metal is poured into the mold through a small cup that is attached to the top center of the casing and lined with sand.

The machine on which the sand is rammed in the castings is shown in Fig. 4. The moving item is the driving gear from a scrap bicycle, and is attached to a light column and rack by which the pattern for the bushing is moved either up or down. The remainder of the device also was constructed from scrap material. Loose rings, accurately machined, fit into a circular opening in the table and regulate the size of the desired bushing. This is a modification of a molding machine developed many years ago for molding pulley castings. As a contemplated improvement, the inventor plans to mount the molds on a dolly and pour them direct from the furnace.

ENLARGED MALLEABLE

is Model of Good Housekeeping

By FRANK G. STEINEBACH
Editor
FOUNDRY

DRIVING west on U. S. 12 through Michigan, the motorist will note a landscaped park with ball fields and playgrounds for children at the west edge of Albion. Back of the playgrounds he will note a well kept plant, with a large sign on the highest point of the building telling all who go that way that this is the home of Albion Malleable Iron. At night this three-sided sign (Fig. 2) is illuminated, serving as twenty-mile-radius beacon for airplane pilots.

Or, if the traveler is riding the main line of the Michigan Central, he will see the rear of the plant (Fig. 1) which is unusual in many respects. Instead of the storage yards for flasks and raw materials, which all too often cause the viewer to react unfavorably to that foundry and perhaps to the industry, the railroad here passes two well kept buildings, a wide driveway, truck loading docks and neat plots of grass. The traveler would not be aware that this is a foundry if it were not for two large signs which again proclaim the source of Albion Malleable Iron. All of these signs include the company's trademark, a red circle with a white block letter A in the center.

If the traveler had an opportunity to stop off and visit the plant, he would find the same meticulous attention to good housekeeping practices through the various manufacturing operations. Because the management of this company believes firmly in the importance of good community and personnel relations and works constantly on this problem, company employees and the citizens of the community take great pride in this industrial plant.

The Albion Malleable Iron Co., organized in 1888, occupied a plot of ground near the center of the town, on which the city hall now stands. Castings were produced chiefly for farm implements, wagons, buggies, harness and bicycles. Ten years later the company purchased the present site, a 65-acre tract on Albion street, and built a small foundry at the southeast corner. A new foundry was built in 1906 and 1907, with a 250 x 500-ft molding room serviced by a 50-ft cranebay. This plant now houses the present modern molding, coremaking and melting operations as well as service departments.

Through the years numerous changes in practice were made, but the real movement toward modernization and mechanization started in 1937 with the introduction of numerous practices to reduce manual labor or improve product. These practices included duplex melting, mold conveyors and sand handling systems, monorail handling of metal, core blowers, gas-fired annealing furnaces and a laboratory. The recent completion of a new building program, adding 120,000 sq ft of floor space for sorting, cleaning, annealing, shearing, straightening, painting and shipping operations, brings the program up to date. But the management of Albion never feels that the job is done. Therefore, plans are being developed to introduce changes which will increase output and thus balance the capacities of the various departments of the plant.

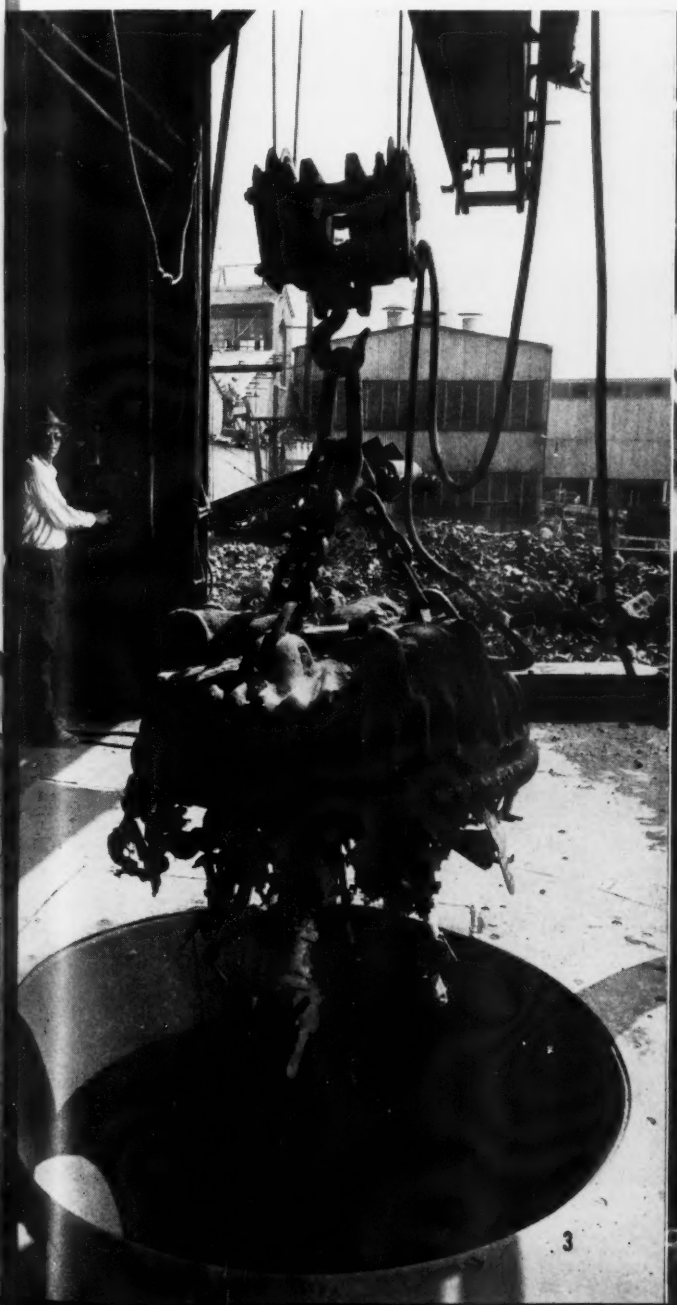
Fig. 1—Rail travelers see well kept buildings, a plot of grass, and signs proclaiming that the company makes malleable iron

LBION IRON FOUNDRY

Fig. 2—A large sign, illuminated at night, informs motorists passing on U.S. 12 that this is the home of Albion malleable iron

Fig. 3—Dock has turntable with three scales and charging bucket openings where metallic charges are dropped with lift magnet

Fig. 4—Four groups of molding machines produce more than 1500 molds an hour and use about 200 tons of sand in the process



ENLARGED MALLEABLE IRON FOUNDRY

Albion produces more than 3600 tons a month with single-shift operation in the molding and melting departments, around-the-clock annealing shifts, and two finishing shifts. Changes under consideration will increase this production rate substantially. Most of the malleable iron castings produced at this plant are for the automotive and related industries. At present approximately 35 per cent of the output is defense work.

A general view of the plant layout is shown in Fig. 7. Reading from the right, that portion of the plant along Albion street includes a well designed administration building, engineering department, chemical and metallurgical laboratory, methods laboratory, pattern storage, plant entrance with personnel offices, first aid station and foremen's locker room, above-ground storage for liquid gas and below-ground storage for fuel oil, a compressor house and a warehouse. Several of these departments will be discussed later.

Raw materials are received on sidings to the west of the plant, servicing the shipping, melting and core departments. Core sand storage is located just behind the administration building on the north side of the plant. Sand is discharged from the car, and carried by conveyor and elevator to storage hoppers of 250-ton capacity. From the storage hoppers the dried, 55 mesh lake sand is discharged into one of two mullers. Oil, corn flour and water are added and the batch mulled for 7 minutes. Core sand mixes are carried from the mullers to coremaking stations on an electric, overhead delivery car, shown in Fig. 6. The discharge bucket on this car can be lowered by the operator to a point under the discharge chutes of the mullers to receive the prepared sand.

Many problems had to be solved in installing modern production equipment in this 1907 foundry building, due to headroom limitations and the fact one end of the 500-ft building is approximately 6 ft lower than the other. At some core blowing machines, the headroom is not sufficient for the normal type of hopper over the core blower, so the company has developed a rather shallow, circular hopper with a built-in agitator which pushes the sand to the central discharge. Other hoppers over blowers have pneumatic plungers which push the sand toward the discharge into the magazine of the blower.

Cores are produced at three stations, each built around a vertical type core oven, as shown in Fig. 7. One station has five blowers, and the other two have

Fig. 5—Conveyors carry molds from lines to pouring stations. Ladle conveyors are synchronized with mold conveyor to aid in pouring

four each. Double coreboxes are used wherever possible so that the machine is blowing while the operator is stripping the core just blown. Cores for hubs and small housings are produced from sand having a green compression strength of 0.80 psi, moisture content of 2 per cent and a baked tensile strength of 140 psi. The moisture content of differential carrier cores is somewhat less, about 1.6 per cent, green compression strength somewhat more, about 0.90 psi, and tensile strength the same. The complete cycle, including cooling, on all three vertical ovens is 66 minutes. Special cores and short jobs are blown or hand rammed and baked in three conventional batch type ovens. Unsupported cores are handled on asbestos plates and cores in dryers on wire mesh plates or directly onto oven racks.

Cores are removed from the ovens and placed on pallets which are carried on roller conveyors located at right angles to the oven rack. A special removal jig for one of the carrier cores, which are blown into their dryers, has a plug that pushes the core out of the dryer, and indicates if the core is dimensionally correct. Cores are taken from the roller conveyor, sprayed with a core wash, and then placed on racks for transportation by lift truck to the molding stations.

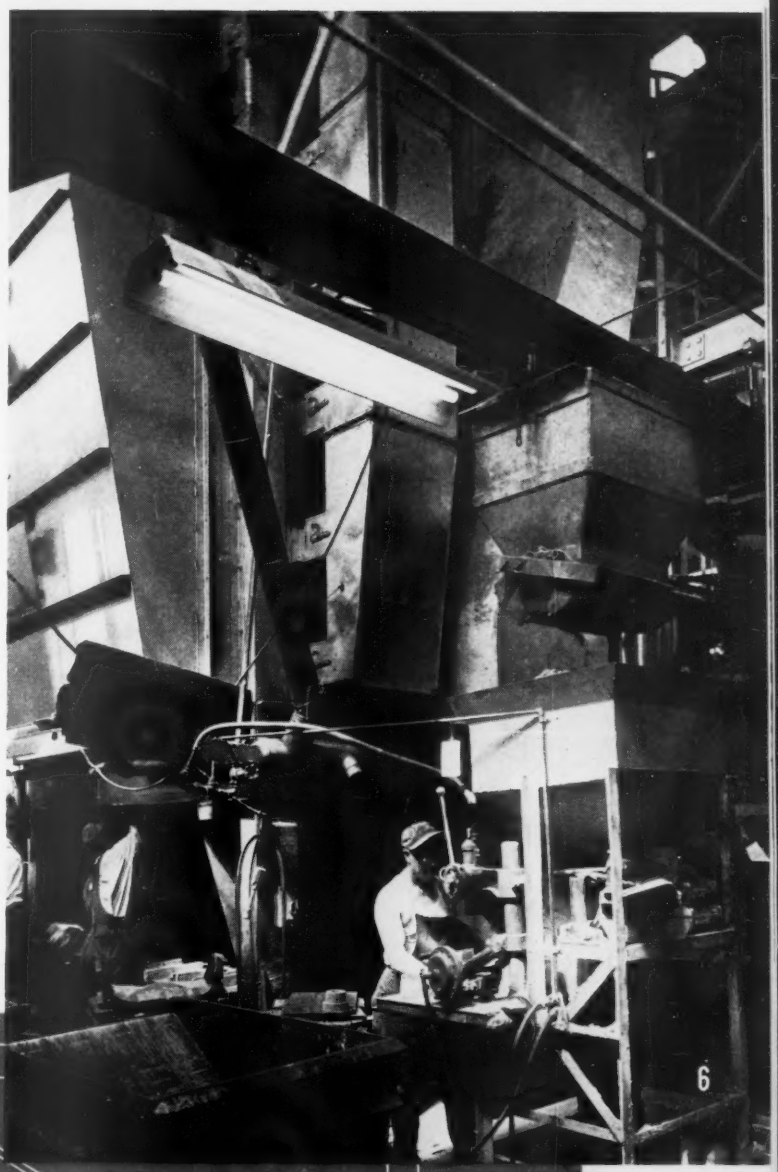


Fig. 6—Cores are produced at three stations, each built around a vertical type core oven

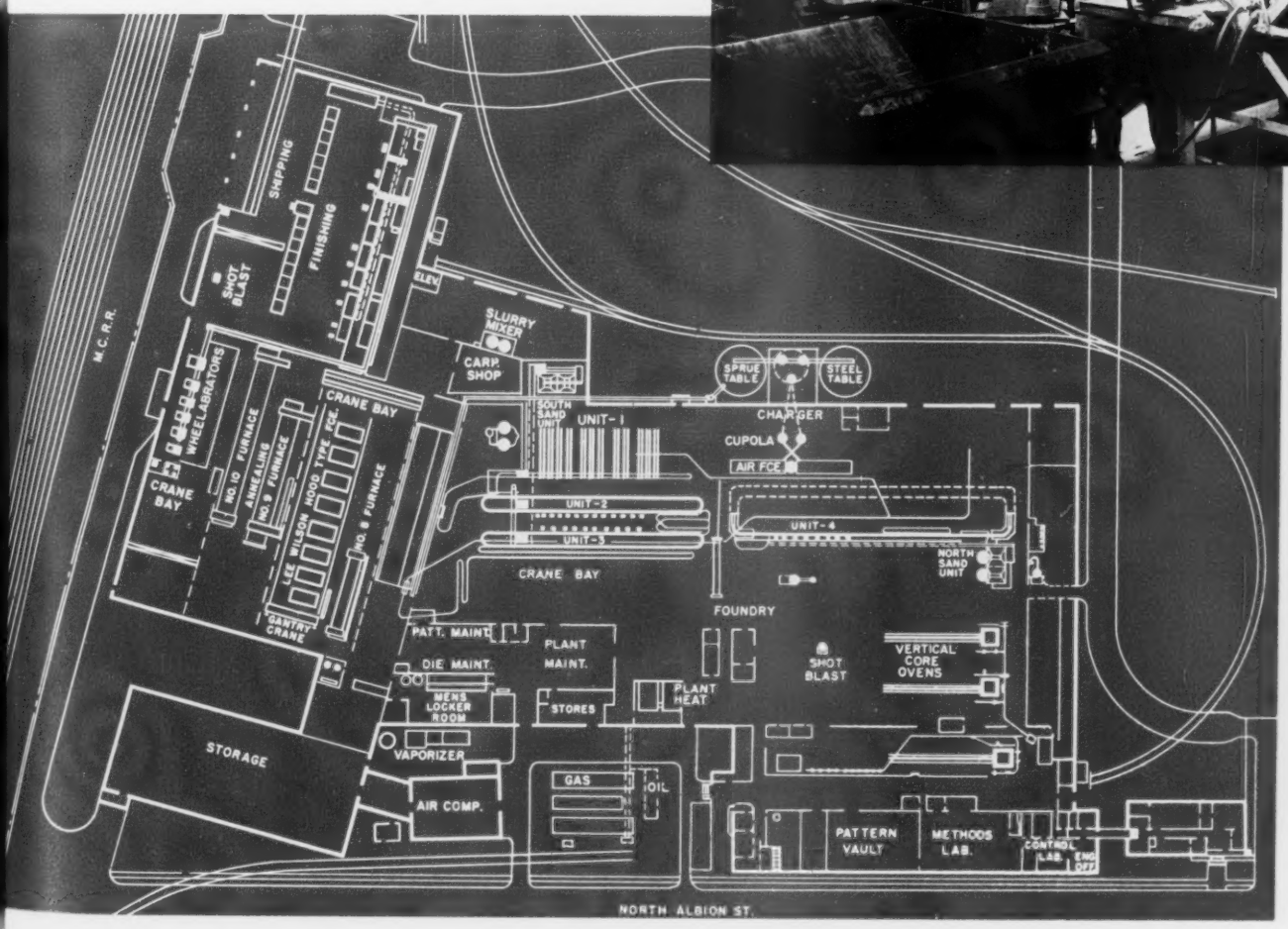


Fig. 7—Diagram of plant. New annealing, finishing and shipping building at extreme left

ENLARGED MALLEABLE IRON FOUNDRY

Approximately 200 tons of sand is needed an hour to produce about 1500 molds. Two separate sand systems are employed, each equipped with two 9-ft sand mullers. The housing for the north sand system supports the sign shown in Fig. 2. Sand is carried from the mullers on belt conveyors and discharged into hoppers over the molding machines. The two mullers at the north end of the plant supply sand for the No. 4 conveyor line, which produces approximately 50 per cent of the tonnage of the plant. This system has a capacity of 300 tons with a turnover of three hours, or nearly three times a shift. The two mullers at the southwest end of the foundry proper supply sand for molding units Nos. 1, 2 and 3. Clay and seacoal are dispersed in water at a central station and piped to the two sand systems, no additions being made directly at the mullers. Sand from the shakeouts passes through screens and over magnetic pulleys to remove wire, chills and pieces of metal.

Synthetic sand is produced with lake sand of 55 grain fineness AFS, a bond of 75 per cent western and 25 per cent southern bentonite, and 5 per cent seacoal. Moisture is 3.2 to 3.6 per cent, green compression 9.0-10.0, and permeability 90-110.

Molding line No. 4 consists of a power conveyor loop with four jolt-squeeze-rollover machines for drags and four jolt-squeeze machines for copes. Barred cope and open drag tight flasks measuring 17 x 31 x 16-in. are used on this line. On a differential carrier casting, the core is set into deep drag pockets. To handle this operation accurately, the company has developed a special core setting fixture which permits two cores of this type to be set accurately and quickly. Molds are poured from an elevated platform, and the ladle conveyor is synchronized with the mold conveyor. Over half of this mold conveyor is in a tunnel under the floor, with two ventilators to carry away smoke and gas. Immediately after pouring, the conveyor drops to the lower level, turns and moves along to the far end where it again comes to the floor level.

Molds are pushed onto a shakeout with a pneumatic ram, and the flasks are placed on a powered conveyor to be returned to the mold machines. The castings are vibrated into buckets located in a pit. When the bucket is filled, it is released by an operator, moves down a slightly inclined roller conveyor to an elevator which then moves automatically to a position several feet above the floor level where the bucket is hooked onto a chain conveyor. These buckets travel 752 ft at a rate of 17.2 ft per minute, thus providing 51 minutes for cooling before arriving at the sorting bins.

Molding units Nos. 2 and 3 are loops, with molds handled on pallets. Molding machines are located in the space between the two loops, and molds travel to pouring loops at the north end as shown in Fig. 7. On Unit No. 3, five 14-in. pin lift machines produce 16-in. square copes 4 in. deep. The same type of equipment is used for the drags.

Molding unit No. 2 has 12 machine stations producing molds in pop-off (*Please turn to page* 278)

Fig. 8 — Metal baskets on chain conveyor carry castings from the various shakeouts

Fig. 9 — Castings are cleaned in six tumbling type airless blast cleaning machines

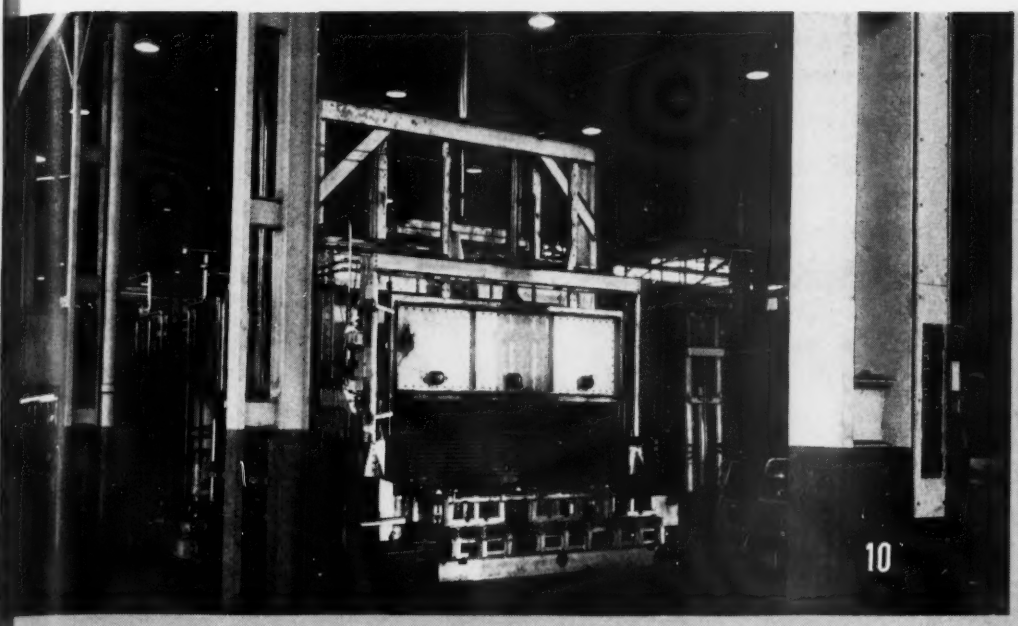


Fig. 10—Continuous, radiant tube type annealing furnace provides controlled atmosphere

Fig. 11—Castings are loaded into company trucks for transportation to customer

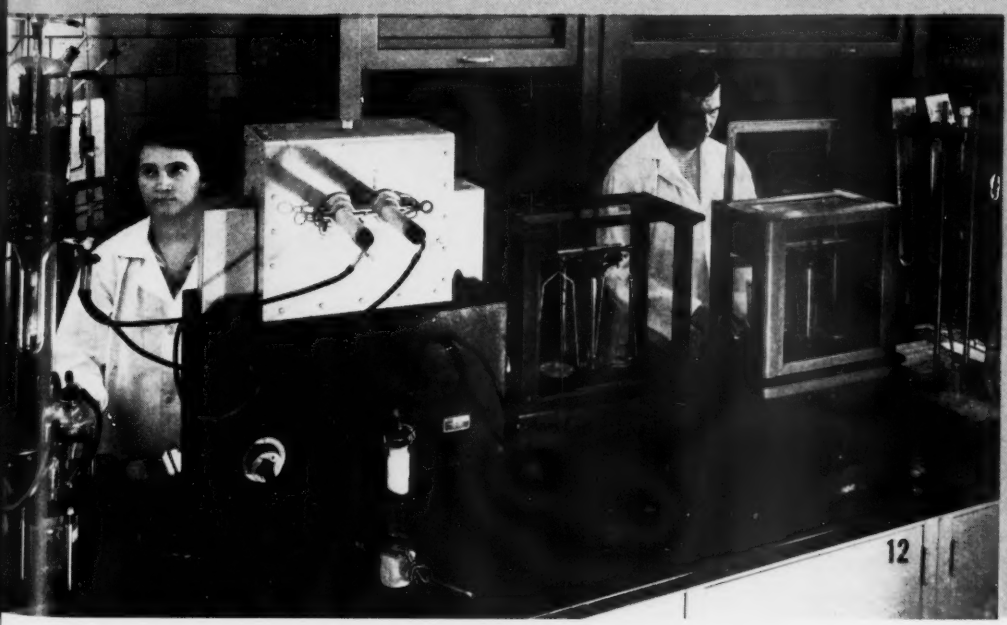
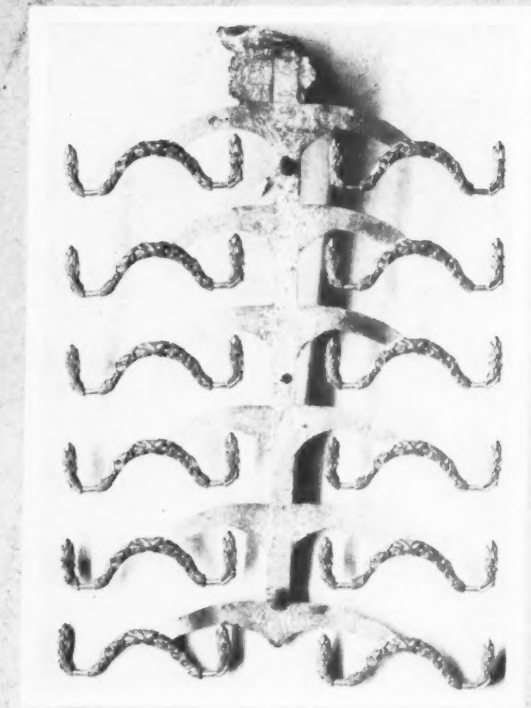
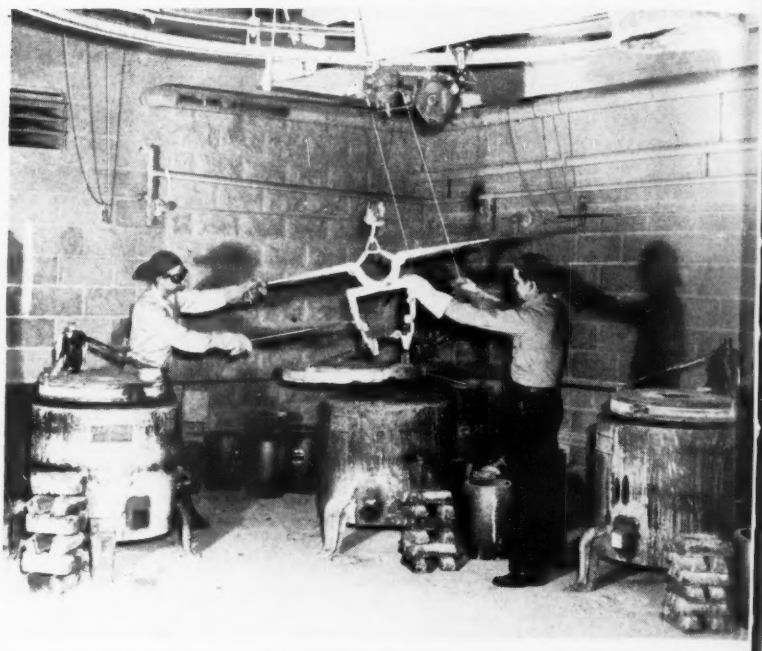


Fig. 12—Control laboratory provides melting department with metal analysis

ACCURACY Is Byword in FINE-



Closeup of the casting after shakeout gives a good idea of the perfect retention of fine detail. Note absence of fins



The melt room. Oil-fired furnaces continue to right in semicircle

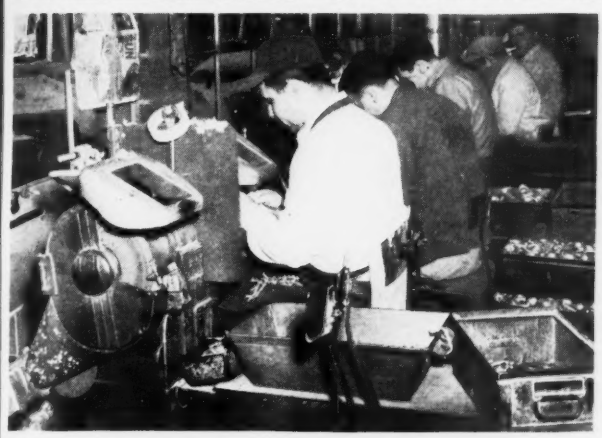
Chautauqua's chief designer Cornell Hazenberg, tops in his field, finishes a white metal model. On desk is a design in clay

Close-up of modified jar-squeezer with the cope and drag set for squeezing operation

Main production area in foundry reflects good housekeeping attitude. Chautauqua is consistently cited for fine safety record

HARDWARE FOUNDRY

Hardware castings shown being sheared from gates



Last step is grinding where the gates were attached

Much of the cleaning room equipment was designed and built by the department's ingenious employees

ACCURACY carried out to the ultimate degree in every phase of operations characterizes the foundry of Chautauqua Hardware Corp., Jamestown, N. Y., where intricate, ornate, finely etched hardware is cast in brass or bronze. The company specializes in fine hardware for furniture and buildings, with former currently taking up about 75 per cent of production capacity.

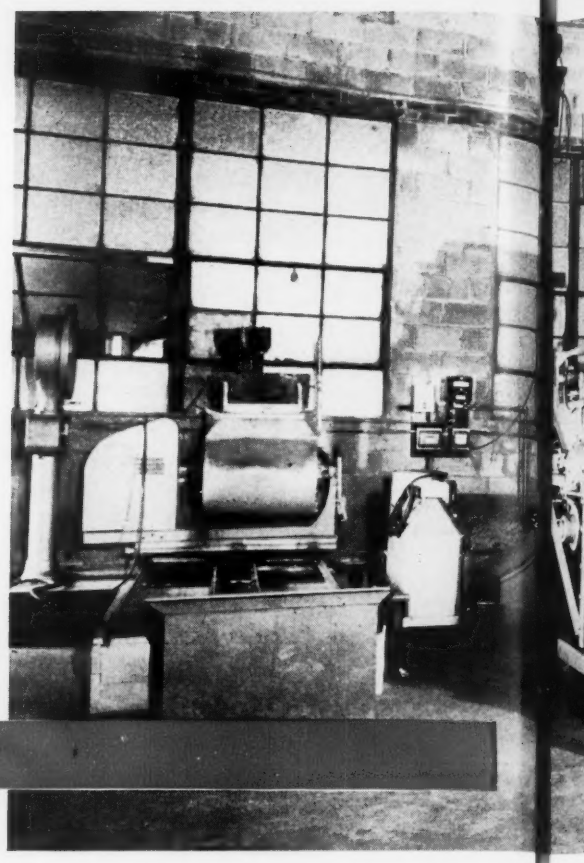
Organized six years ago, the company today is the world's second largest producer of this type of product, and is an important adjunct to the furniture-producing area in which it is located, as well as to the national industry. The company family now numbers about 185 people—40 in the foundry and allied operation, 130 in tumbling, burnishing, plating, assembling, inspecting and shipping and 15 in the general offices.

Foundrymen and lay persons, both of whom generally associate bulk, heftiness and relative roughness with castings, are likely to view the Chautauqua foundry's products with amazement. It is a foundry where cope and drag sand mold techniques are employed to make intricately-designed castings, many types of which weigh only a small fraction of an ounce. Orders filled by the company are for from half a dozen pieces to large quantities requiring a solid week of production run to fill.

Moreover, there is little monotony in Chautauqua's business. Whereas for other foundries the basic design of, for example, a valve body would never undergo radical changes, furniture hardware is subject to the whims and foibles of styling, with marked trends occurring annually. As a result, pattern storage rooms at Chautauqua contain nearly 3000 different patterns which, when projected into all possible combinations, almost reach an infinite number. If one counts only the basic 3000 patterns, the company has developed two designs through the pattern stage for every working day in its six years of existance.

But back to accuracy and perfection as prime factors in Chautauqua's operations, for, as Allen F. Jones, president of the company, puts it, "accuracy and perfection are our stock in trade from pre-sales to shipped order."

The company doesn't wait for orders. Instead, in 90 per cent of the cases, a staff designs and creates original pieces which are then sold to eminent furniture designers and producing companies. Creative ideas for the hardware spring from strange sources—a trip to Europe, a dusty library book, a New York antigue shop or the brain (*Please turn to page* 212)



Conventional Casting Cast in Shell Molds

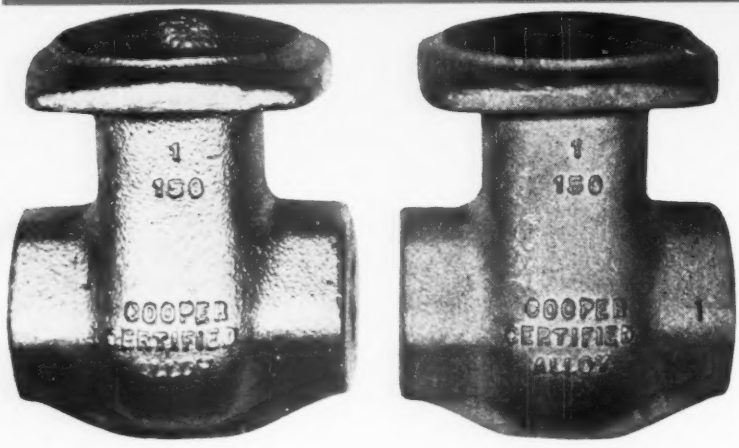


Fig. 1—Fine smooth surface and sharpness of characters on casting clearly identifies that made in a shell mold

Casting Stainless Steel

IN SHELL MOLDS

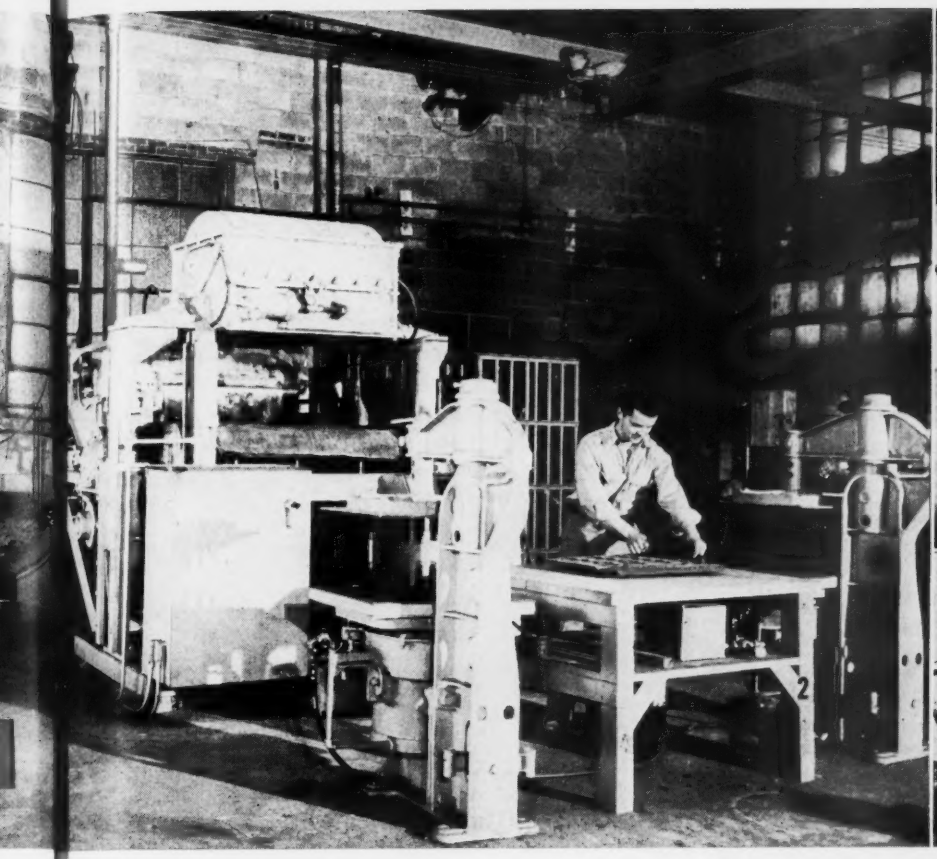


Fig. 2—View showing scale and sand conveyor, shell mold machine, and closing presses and work table

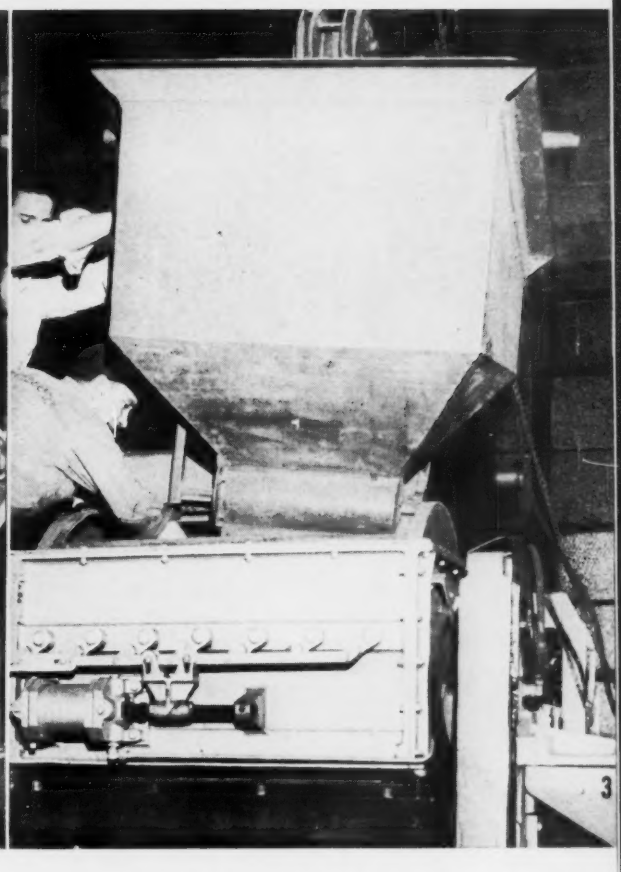


Fig. 3—Sand-resin mix is elevated and discharged into dump box mounted on shell molding machine

ABOUT two years ago Cooper Alloy Foundry Co., Hillside, N. J., began a study of the feasibility of applying the shell molding process to the production of stainless steel castings. Today the procedure is standard foundry practice for making many of the firm's high-alloy valves and fittings as well as other heat and corrosion resistant steel castings. The accompanying illustrations show various steps in the method as practiced in producing valves and fittings. Advantages claimed are increased yield and decreased rejects, closer tolerances and smoother surface.

Sand used is 160 AFS fineness and is mixed with 8 per cent phenolformaldehyde resin, 5 per cent iron oxide and 0.25 per cent wetting agent. Machine used for making molds was built by Shellmold Machine Co., College Point, Long Island, N. Y., which incorporates a dump box for the sand-resin mix, and a movable oven for heating the patterns and curing or polymerizing the resin. Control panel permits automatic or semi-automatic operation.

In operation the oven is moved over the pattern plate to preheat it to 500°F. It then is retracted and the plate is sprayed with a silicone release agent. Preheating requires about 4 minutes. The dump box containing the sand mix is moved over the pattern, the louvers opened to permit sand to fall, and after a few seconds the whole is rolled over allowing excess, unaffected sand to drop back into the dump box.

Fig. 4—Close-up of patterns in shell mold machine

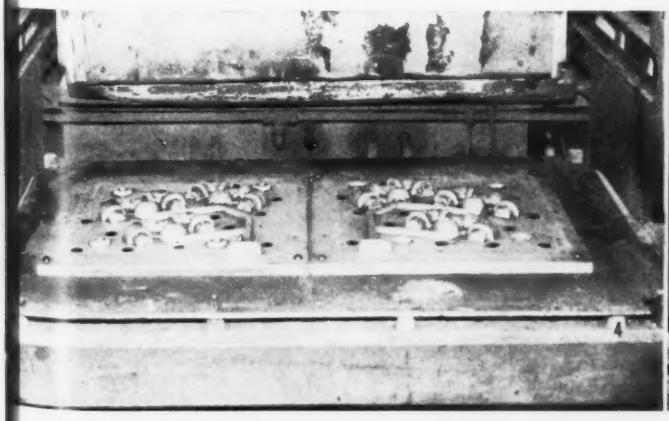
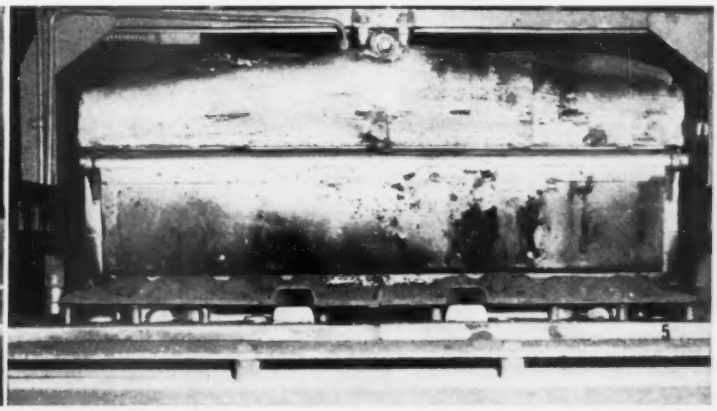


Fig. 5—Mold being ejected from the pattern plate



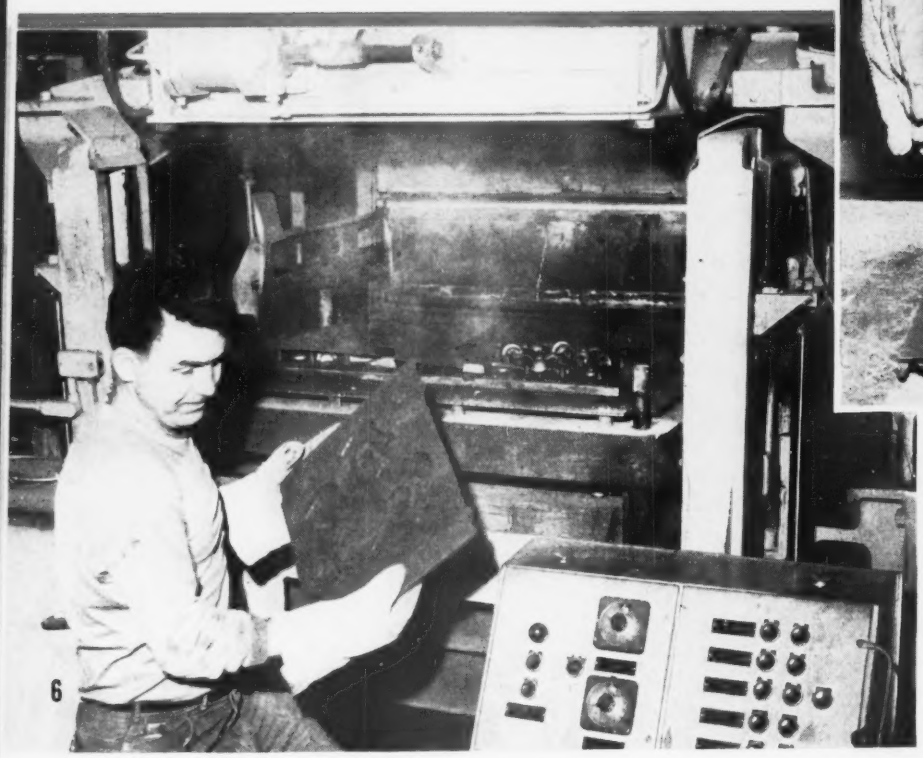


Fig. 6—Removing mold from the machine. Control panel at right

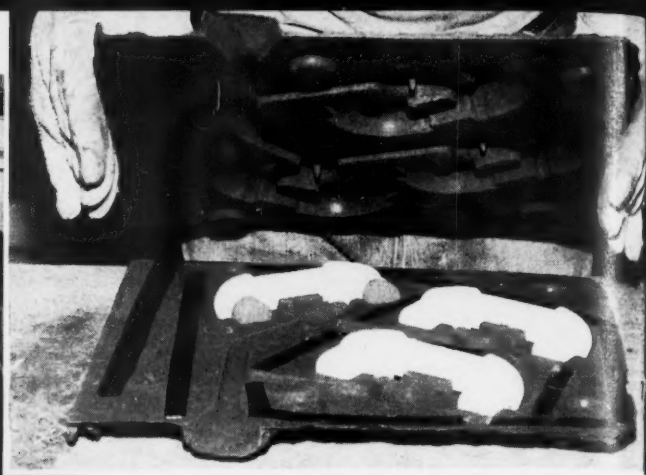


Fig. 7—Adhesive tape used to fasten the mold halves together

Fig. 9—Shell mold following completion

Fig. 8—Pressure is applied by springs

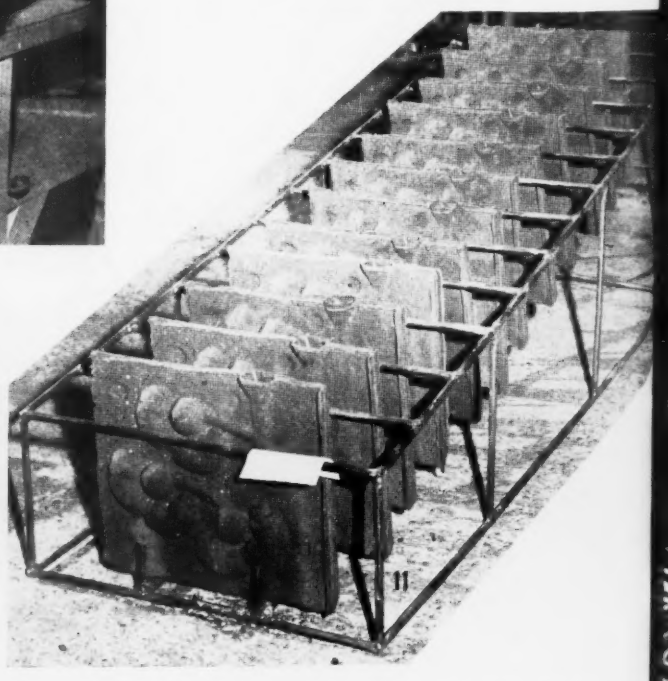


Fig. 11—Simplified pouring rack holds 12 shell molds

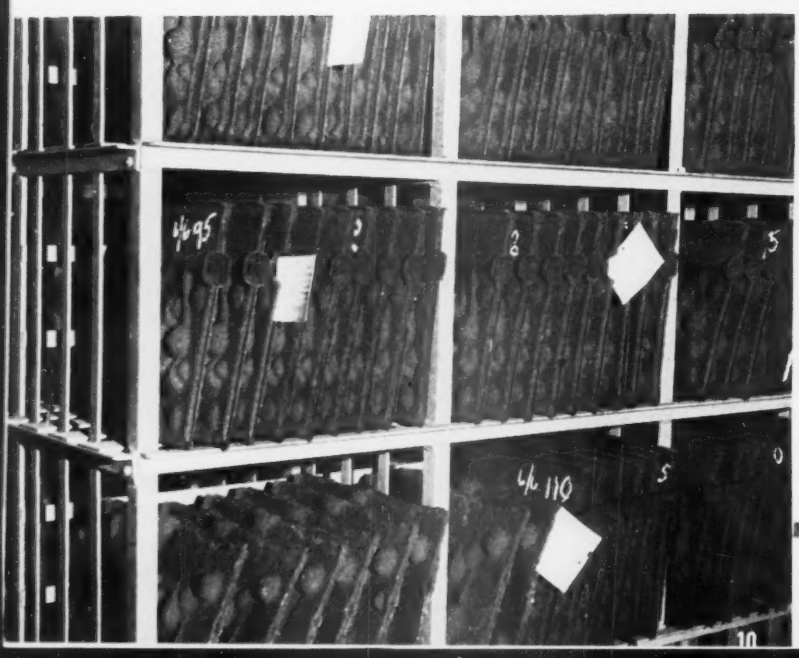


Fig. 10—Mold storage racks hold over 200 molds

Louvres are closed and the whole assembly rolls back to the original position whereupon the dump box is raised. The oven is moved over the thin sand shell on the pattern plate and the heat provided by the oven cures or hardens the shell at 500°F in 15 to 30 seconds. After oven retraction, the mold is ejected.

Strips of a special adhesive tape are placed on various portions of the face of one half-mold particularly along the outer edges and between cavities, as shown in Fig. 7, and the other half is located in position. The assembly then is placed in one of two closing presses, shown in the foreground of Fig. 2, and in Fig. 8. As may be observed in the latter illustration, the pressure is distributed uniformly to the mold surfaces by springs mounted on the ends of the machine pins. Pressure employed is about 600 psi.

Molds then are placed in storage racks shown in Fig. 10 which hold over 200 molds, or in the pouring rack shown in Fig. 11. This will hold 12 molds, and is arranged so that the molds are at a slight angle which permits the molten steel to flow smoothly along the side of the sprue rather than to drop precipitately to the bottom of the sprue with consequent splashing and turbulence.

Shakeout is a simple problem since the high temperature of the steel poured into the molds burns out the resin leaving an extremely brittle shell. Often the weight of the gate of castings is sufficient to break the mold, allowing the whole to drop to the floor, whereupon the castings can be picked up and forwarded to the department for removal of gate and runner system. Surface obtained on the castings is quite smooth and the identification characters are sharp as indicated at the right in Fig. 1.

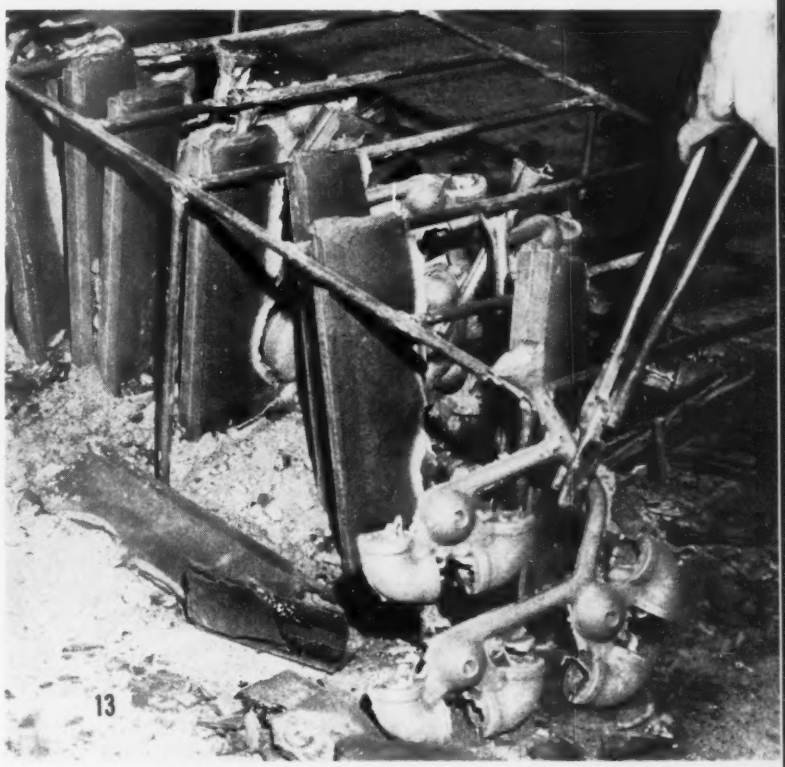


Fig. 13—On shakeout, brittle shell falls away easily

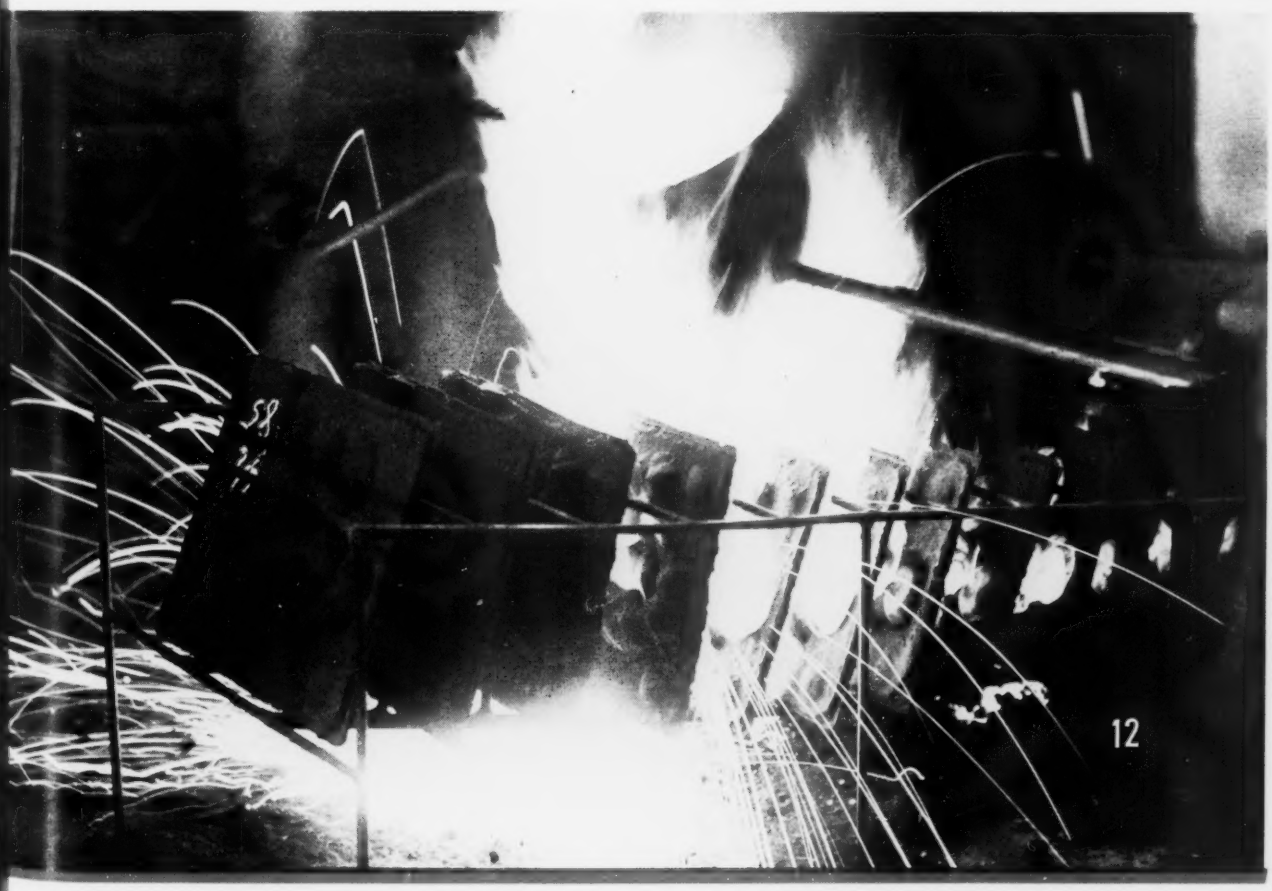
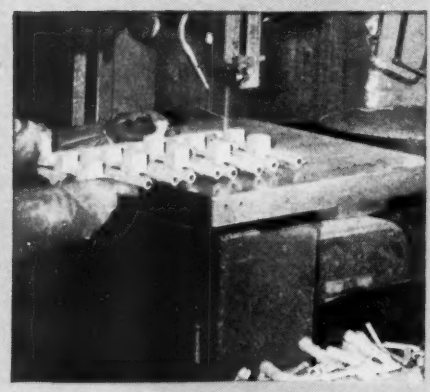


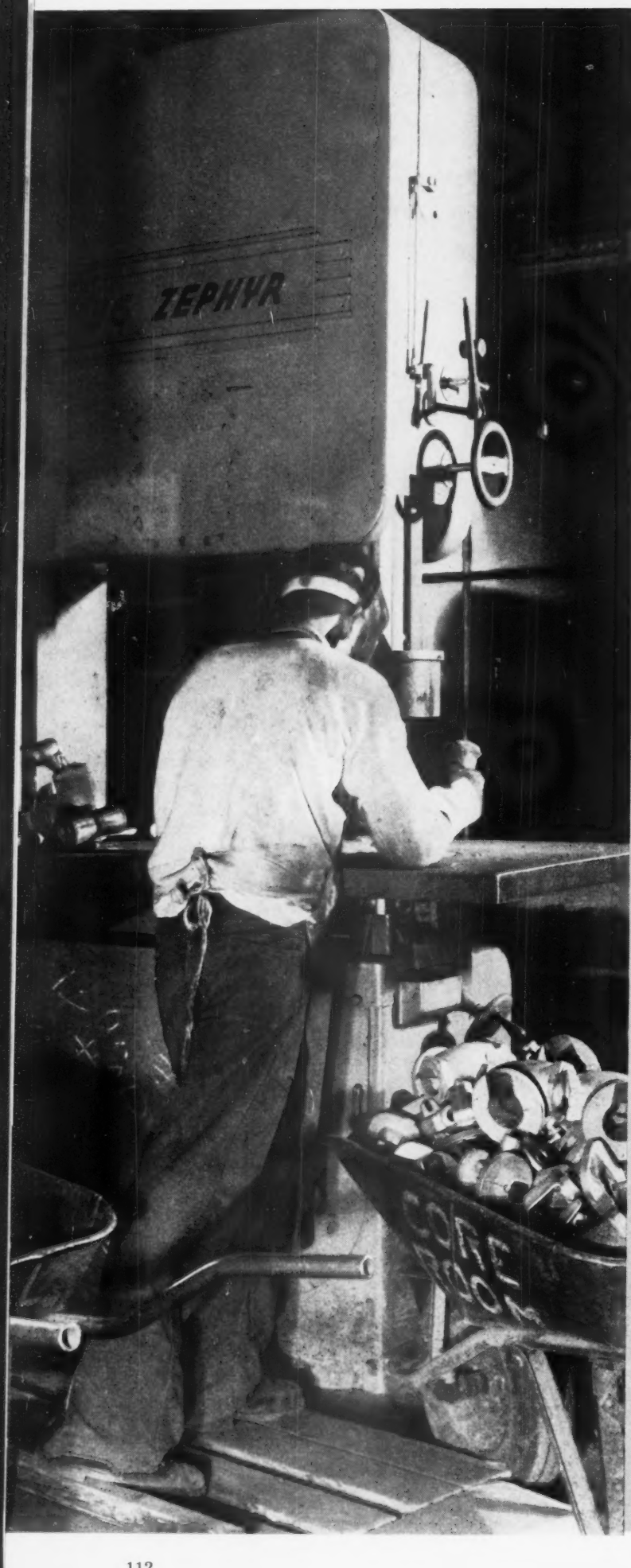
Fig. 12—Molds are poured off with rapidity and ease

BAND-SAWING

Sawing 25 sq. in. per min. of 1-in. aluminum risers with a ½-in., 3-pitch buttress band at 3000 fpm



All nine cuts (these ½-in. magn sium gates are exe uted in 0.018 mi utes with a ½-in. pitch buttress ba at 3500 fpm



(Right) — A precision type, ¾-in., 6-pitch standard band cuts 1⅛-in. sections of 90-10 brass at 2000 fpm. Production time is 0.010 minutes a cut

(Left)—A standard ¾-in., 6-pitch band does six 1-in. cuts a minute at 400 fpm on 2 per cent silicon content bronze castings

NONFERROUS CASTINGS

By H. J. CHAMBERLAND
Research Engineer
DoALL Co.
Des Plaines, Ill.

BECAUSE nonferrous metals are not in the friction sawing category, any gate and riser cutting operation on aluminum, magnesium, copper, brass or bronze castings is one of actual sawing, whether blade velocity is 5000 fpm or 100 fpm. What this velocity should be depends to some extent on thickness of cut, but particularly on the composition, hardness and abrasiveness of any of these materials. Primarily one should bear in mind that those metals having abrasive characteristics are the ones most detrimental to saw life. Only through proper blade selection, control over velocities and the application at times of a lubricant, can the most economical relationship between cutting rate and blade life be established.

Every nonferrous material reacts more or less differently to varying saw speeds; generally speaking, castings are usually softer than cold worked or extruded shapes, and extrusions are softer than rolled shapes. With some, a lubricant extends saw life considerably, whereas with others lubrication shows so little improvement as not to warrant its use. It should also be mentioned that three types of saw bands are effective to expedite the cutting of these materials. On aluminum and magnesium, the buttress type of saw is usually preferred; however, on sections under ⅜-in., a precision standard pitch band is recommended. The buttress saw has widely spaced teeth and provides coarse tooth construction to narrow contour sawing bands, with maximum chip clearance for free and cool cutting action.

The claw tooth is a relatively new band development and is giving excellent results, especially on sand and permanent mold aluminum castings. The teeth of this band are cut by a special process which results in a positive rake and a more acute cutting angle than 90°. Chips are thus produced more freely than by other types of tooth construction. Castings of brass, bronze and copper compositions react more efficiently to a standard pitch band. All three bands are of the precision type—that is, the teeth are hardened to resist long cutting periods under most severe conditions. Contrary to ferrous castings that are friction cut, material thickness in this case is not a factor and is limited only by machine sawing height capacity.

Aluminum and Magnesium Castings — Aluminum and magnesium gates and risers are today seldom cut at conventional speeds since the high-speed technique is three to six times more productive. However, various types of aluminum have more or less abrasive characteristics, and although the silicon contents impart wear-resisting qualities, they do render high speeds impractical in favor of blade life. Unless the degree of abrasiveness is really of concern, many production keymen seem to be satisfied with cutting rates and tool cost under dry cutting conditions and disregard the use of a lubricant.

The more severe the abrading action, the more thought should be given to the conventional speed range, for any loss in cutting rate due to lower speeds will be amply compensated for by increased tool life. The fact remains that as many as 1000 sq in. could be cut at conventional speeds of from 200 to 500 fpm, whereas the same saw would not resist 50 sq in. at speeds of 3000 or 4000 fpm. When cutting at low speeds, feeding pressure is important; it should be only medium at the most and preferably be under hydraulic work feed control for forming comparatively heavy chips. The use of a lubricant is, however, a pertinent factor for optimum blade performance, especially as a chip welding preventive.

Most magnesium castings are cut at high velocities, and cutting rates compare favorably with results on aluminum. A factor worth considering with high-speed band sawing is that a particular velocity will serve for a far greater material thickness range than do conventional speeds. On both aluminum and magnesium casting sections, for example, the recommended velocity of 3500 fpm for a ½-in. thickness drops to only 2600 fpm for a 6-in. or thicker section, and this could be standardized at 2800 to 3200 fpm. Under conventional sawing speed procedure, at least six changes in velocities would be required to cover this material thickness range.

Magnesium may be sawed dry, but lubricating the blade with a tallow stick helps materially for cooler cutting. The tallow need be applied only previous to each cut or number of cuts, depending on circumstances. It is understood, of course, that the cutting of magnesium creates more or less of a fire hazard that should not be ignored. Chips and dust should not be allowed to accumulate on the machine table or any of its surroundings, and a box of dry sand close at hand is a low cost but (*Please turn to page* 220)

QUESTIONS

Too Much Binder in Core Sand

Q.—We are having trouble with a radiator core for a furnace. This core is made in a drier approximately 4 in. wide, 12 in. deep with 5 degree draft on the sides. When we use flour in the core sand mixture it is almost impossible to clean the sand out of the casting. When we use an oil sand core mixture it is impossible to get the core out of the drier. We have been told that these cores are made elsewhere in green sand on some form of collapsible arbors. If the idea is practical we should like to adopt it. The arbor would have to be removed from the casting through a 5 in. square hole on one side and an 8 in. diameter hole on the opposite side. Any information you can give us on these points will be highly appreciated.

A.—The fact that you experience considerable trouble in cleaning a flour-bonded core out of the casting would seem to indicate that you are using too much flour, too much molding sand, or both, in the core sand mixture. Since you are making the core in a drier, the amount of bonding material may be reduced to a minimum. Cores for this class of castings are made just strong enough to handle when they are dried.

One reason why the oil sand cores stick to the drier may be because you are using too much oil or too much water. Second reason may be because the oven is not operated at the proper temperature, 450°F for oil sand cores. A third reason may be because the drier is not provided with vent holes on the bottom and sides. Present trouble may be owing to any one or a combination of these causes.

Collapsible arbors for green sand cores are employed extensively in many foundries. Without a drawing or a more detailed description of the radiator, it is not possible to say that the idea may or may not be adopted in this particular instance. We suggest you mix a weak batch of oil core sand. If the drier has no vent holes, line the bottom and sides with a single thickness of newspaper. Dry the core with a hot fire and rap the drier before attempting to remove the core.

Wants Smooth Skin on Castings

Q.—We would like to obtain a smoother skin on the outside and the inside of our bronze valves made from 85-5-5-5 ingot and weighing from 1 to 3 lb. Molds are made in No. 00 Albany sand and cores are made from a mixture of beach sand and the same molding sand.

A.—In general it may be stated that a clean smooth skin on small castings results from the use of fine-grain sand in the mold. On large or heavy castings where high temperature is an important factor, the sand face is coated with a refractory material applied as a wash or in the dry state. In your case the castings are light and the sand you are using is quite suitable. It should not be necessary to apply any refractory material. Appearance of the casting is improved by dusting a small amount of flour from a cotton bag over the face of the mold. The flour, through a slight absorption of moisture, imparts a light skin drying effect, and later in the burning develops a protective gas which produces a clean surface on the casting.

Fine-grain core sand also is required to produce a smooth surface inside the casting. Fortunately, possible combinations are available in wide variety, ranging all the way from an all clay-free mixture to a 50-50 mixture of sharp sand and a fine-grain molding sand. The clay-free sand also is known as beach sand, fire sand, sea sand, silica sand and silver sand. Main feature in some cores is high permeability. Clay content in molding sand addition produces a smooth skin but reduces the permeability. The combination is a compromise arrived at by experiment. Plunging the hot casting in a tank of water serves a double purpose. It ejects the core violently and also improves the surface appearance. Cleaning the castings with sand and water in a tumbling barrel is practiced to a considerable extent.

Making Sleeves Centrifugally

Q.—In our foundry in Argentina we are making cylinder liners or sleeves by the centrifugal casting process, and are having trouble in obtaining satisfactory castings. These come out with the outside surface all wrinkled and machining shows many little holes. Surface also is very hard and the metal appears stratified. Sleeves are 3½ in. OD. Mold is 1040 steel, and rotates at 800 rpm; water cooling is used at 200°F. Machine and mold vibrate in operation. Iron composition shows 3.30 per cent TC, 2 per cent Si, 0.40 per cent Mn, 0.130 per cent S, and 0.15 per cent P. Pouring temperature is 2200°F. We would like to know the following: Mold material, mold speed, temperature of cooling water, possibility of air cooling, mold temperature, iron temperature, speed of pouring, material for pouring cup or funnel. We use cast iron, but the iron sticks to it. Also what heat treatment should be used to give 220 to 240 brinell hardness number

A.—In looking over the information submitted we note that the pouring temperature of the iron is 2200°F, the molds are water-cooled, and that you are having trouble with a wrinkled surface and sur-

and Answers

face holes. It appears to us that the metal temperature given is not correct since it is only slightly above the liquidus for the composition involved. We believe that the pouring temperature should be 2400 to 2500°F. Possibly your temperature is in that range, and the temperature measuring device is not functioning correctly. It may be that your mold is operating at too low a temperature. It should be at least 200 to 300°F and probably around 400°. We suggest that you try operating the mold without any cooling and see what difference it makes.

As far as molds are concerned they can be made of cast iron as well as steel, and you could make your own from the same composition used for the liners. You might try coating the mold walls while they are hot, with a thin refractory coating of silica flour with a little bentonite or clay as a binder and perhaps a little sodium silicate. This will protect the mold surface, and the same material can be used for coating the pouring cups or funnels to prevent the iron from sticking to them.

Your spinning speed appears to be somewhat low for the 3½-in. diam tubes or sleeves, and should be around 1100 rpm to provide a centrifugal force of 60G (centrifugal force times gravity). However, instead of abruptly changing to that speed, we suggest trying 900, 1000 and 1100 rpm, and observing results obtained as well as vibration characteristics. Possibly an increase in speed may decrease the vibration—and then again it may be worse.

Plain gray irons are not too easy to heat treat and obtain consistent results, due to rapid changes within the usual transformation ranges; generally alloys are employed to slow down these changes. However, we can only suggest the procedure, and from that you will have to make proper adjustments to obtain the desired results. We suggest that you heat the liners to 1500°F and quench in oil, using arbors to prevent distortion, and then draw or temper at 1000°F. If the liners are too hard, increase the drawing temperature; if too soft, decrease the drawing temperature.

Selenium Reacts with Sulphur

Q.—In an article "Factors Affecting the Qualities of Cast Steel," by T. N. Armstrong, which appeared in the December, 1951 issue of FOUNDRY, reference is made to additions of selenium to cast steel. We will appreciate information on the form in which selenium is added, and where it is available.

A.—We suggest a study of A. P. Gagnebin's article "Influence of Selenium on Sulphide Inclusions and Ductility of Cast Steel" which is available in *Transactions* of the American Foundrymen's Society, Vol. 55, 1947, pages 277-286. Therein he demonstrated that selenium has the ability to coalesce the intergranular sulphides in cast steel, and thereby improve its ductility. In addition, selenium refines the grain and is a mild deoxidizer.

Gagnebin used selenium alone in initial experiments and then found that a combination of selenium and calcium silicide decreased considerably the amount of selenium required. Proper amount, according to the author, is from 0.05 per cent Ca and 0.03 per cent Se to 0.10 per cent Ca and 0.06 per cent Se. Selenium may be obtained as the metal or as ferroselenium from producers listed in the advertising pages of FOUNDRY.

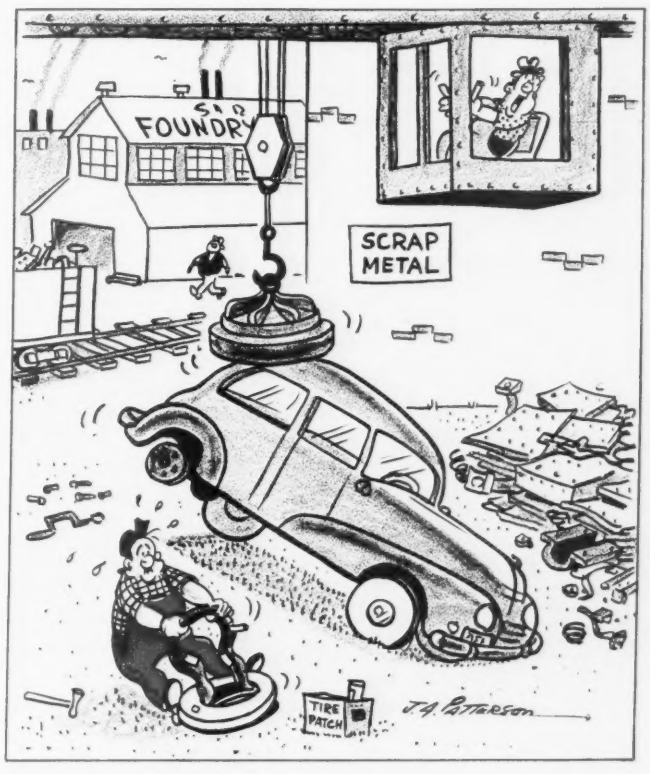
Prevent Burning of Magnesium

Q.—Recently we had some calls for a material which is used in connection with magnesium melting to prevent the magnesium from bursting into flame while pouring. We understand that there are some mixtures of sulphur and boric acid on the market for this purpose, and would like to know the proportionate parts. We also would like to know of any manufacturers making such a product for distribution to the foundry trade.

A.—Common practice for a long period to prevent "burning" of magnesium alloys during the pouring operations was to dust the stream from the crucible with finely divided sulphur by shaking it from a can with a perforated top similar to those used by con-

GANGWAY!

By J. A. PATTERSON



"Hurry up and get it fixed—I think I see th' boss coming."

fectioners for sugaring their wares. Mixtures of 50 per cent sulphur and 50 per cent boric acid also were and still are being used. However, investigation in that field led to the development of dusting agents formed from a mixture of sulphur, boric acid and ammonium fluoborate which is claimed to give better protection. We suggest that you write to Dow Chemical Co., Midland, Mich., for information on dusting powders and fluxes for magnesium alloys.

Must Change Cupola Procedure

Q.—A problem in our foundry is a sudden drop in total carbons from 3.50 to 3.20 per cent, and a fluctuation in silicon content from 1.80 to 2.34 per cent. These changes occur mainly around 9:30 a.m. Occasionally we may have it on the start of the heat and then again not until the second shift starts at 3:30 p.m. During the time the drop appears our chill tests will increase gradually from 7/32 to 30/32-in. Two cupolas are used alternately and the trouble happens with both although some days it does not. Our cupolas are lined to 75 in. with a smooth contraction or bosh beginning about 6 ft above the tuyeres; at 4 ft diam is 63 in., and at 2 ft above the tuyeres the diam is 48 in. Bosh then expands gradually to 56 in. just above the tuyeres. Coke bed is 60 in. deep with 4000 lb coke; charges weigh 2000 lb composed of 700 lb pig iron, 600 lb returns, 300 lb purchased scrap, 100 lb cast iron briquets, 300 lb steel scrap, 20 lb silicon carbide, 7.5 lb silicon briquets, 3.1 lb manganese briquets. Coke splits are 225 lb. We have a hot blast unit which heats the air to 360 to 400°F. In charging, the bed is put in up to 63 in.; the iron charges put in, and the bed lighted by gas torches from 12:30 a.m. until 2 a.m. Tuyere doors are left open until 5 a.m., and closed except one. Blast is turned on at 6:45 a.m. starting off with 9000 cfm. Iron is trickling down in 4 minutes, and in about 15 minutes the taphole is opened. In 20 minutes we usually have too much iron and the blast is cut back to 5000 cfm. Five or ten minutes after we increase to 7000 to 9000 cfm, and then in half an hour we level off around 6000 cfm. Rest of the day we operate between 4000 and 9000 cfm.

A.—In addition to the variations reported in the total carbons and silicons, we would also expect considerable difficulty in metal temperatures. The extreme variations in chills reported would almost have to develop because of the operating conditions mentioned.

Present practice of lighting up the cupola gives absolutely no control over proper conditioning of the bed, and should be completely modified. For reliable results the following is suggested: Place two-thirds of the total bed in the cupola, light off at not less than four tuyeres evenly spaced with all tuyere doors open. When the coke has been ignited properly, close all tuyeres and put on the blower at half speed until the bed is red all over. Add the remainder of the coke, and use wind or natural draft to burn the rest of the bed through to a hot condition all over. Final bed height should be 60 to 65 in. before charging.

The coke split of 225 lb is inadequate with the present iron charge, particularly with the extreme variation in wind rates, even with hot blast. Therefore it is suggested that until the iron analysis and temperature recover to the desired levels, the coke splits be increased 15 to 25 lb. When recovery has occurred, the coke can be reduced gradually to that amount sufficient to produce the desired operating conditions. Present high chills, low carbon, etc., indicate an advanced state of oxidation, and returns of this material will have to be worked off gradually before the coke can be reduced. Possibly the cast iron briquets should be eliminated from the charge temporarily since their use may cause both carbon and silicon losses and produce high chills. When satisfactory melting conditions have been established, then additives of briquets could be made to determine the proper amount.

No cupola can be operated efficiently with the extreme variation in amount of air you mention. If 6000 cfm will deliver the right amount of iron for demands, then that should be the rate at the start, and maintained through the heat. It must be remembered that any increase in air from a given level will automatically burn the coke away faster than it can be replaced, resulting in oxidation. Conversely, if the air rate is dropped from a given level, the bed will rise, and temperature and melting rates will decrease correspondingly. Unquestionably, hot blast on a cupola will improve materially the average operating conditions. In this instance, however, it cannot function properly because of the extreme variations in air rate.

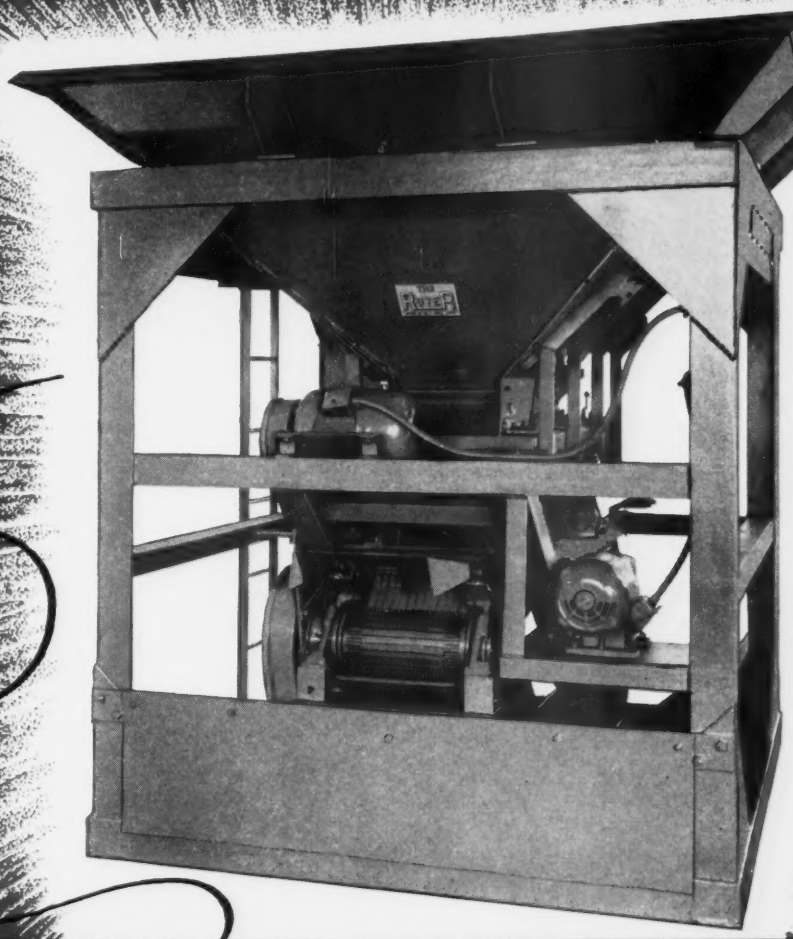
Blowholes from Several Causes

Q.—In our cupola lined to 48 in. each charge is made up as follows: 450 lb malleable pig iron, 550 lb purchased agricultural scrap, 500 lb shop scrap, 150 lb steel, two carbon briquets, one silicon pig, one manganese briquet, one brick proprietary flux, 30 lb limestone, 200 lb coke, with four carbon briquets on bed charge. Coke bed is 50 in. above tuyeres. Cupola is slagged at the back. We are having considerable trouble with blowholes in our machine tool castings. We are wondering if this is due to the use of unsatisfactory material in the charge, or to faulty cupola operation. The holes appear in the side walls, in the cope, but most are in the drag. Sometimes we believe there are too many things going into the cupola, and that if we increase our pig iron content, cut down on the foreign scrap, use the same amount of steel as at present, also the proprietary flux and one silicon pig per charge we could eliminate a lot of trouble. Would you recommend reducing each charge to 1000 lb? Where can we secure books on cupola operation and iron mixtures?

A.—While your cupola charge contains more than the usual number of items, under proper melting conditions the resulting metal should be satisfactory. Without the carbon briquets and the single high-silicon pig, the iron would be too hard to machine.

(*Concluded on page* 118)

Built-in MAGNETIC SEPARATION



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QUESTIONS and Answers

(*Concluded from page* 116)

Your suggestion to increase the pig iron content and thus raise the silicon and carbon content and, incidentally, simplify the charging technique is quite feasible. Cost might be a factor in your problem. Which is the more expensive, the increased amount of pig iron or the cost of the briquets? The metal *may* be oxidized in the cupola—some agricultural scrap is pretty rusty—but we are doubtful in this case.

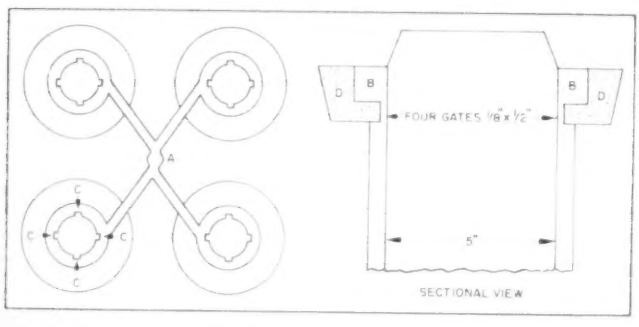
Experience inclines us to the opinion that the molds or cores may be responsible for the blowholes in the castings. Another possible reason is cold melted metal. Any cupola charge containing steel must be melted and poured hotter than ordinary gray iron. Bubbles of gas or steam that might escape from hot metal are trapped by cold metal.

If you have a back file of FOUNDRY for 1951 we can refer you to a complete series of articles by B. P. Mulcahey, entitled "How To Use the Cupola." Recently the series was compiled into a booklet which may be ordered through our book department. A complete treatise on the subject, *Handbook of Cupola Operation*, published by the American Foundrymen's Society, also is available from our book department for $10.

Gate Bronze Bushings on Top

Q.—We are making manganese bronze bushings 5 in. ID, 6 in. OD, 19 in. long. We shall appreciate your advice on the best method for gating these castings.

A.—The best method for gating bushing castings depends to a considerable extent on whether they are poured horizontally or vertically. In this particular instance we should prefer the vertical position with four patterns in an 18-in. square flask. A modification of the method may be applied where the castings are poured singly or in pairs. Assuming that the patterns already are in existence they may be adapted to this method by attaching a flat circular core print 2 in. thick to the top end. This print is for the reception of a core containing the runner and gate passages.



Right—Joint face of drag; runner and cores in place. *Left*—Section showing application of runner core

Detail of the runner and gates is shown in the sectional view where *B* is the runner ¾ x 1 in. and *CC* are the four gates ⅛ x ½ in. A continuation of the runner at a tangent joins the branch runner formed in the green sand of the mold at the joint line, as shown at *A*. Metal poured into a single central sprue feeds all four runners. Turbulence of the flow is checked in the four circular runners and the metal sinks gently through the four small gates *C*.

In many instances drossy, dirty bushings are blamed on the metal or on the gates, when in reality the fault lies in the molds or in the cores. Molds must be rammed hard, particularly around the bottom, to prevent the mold wall from straining. This in turn involves the use of highly permeable sand worked as dry as possible to permit the ready escape of the large volume of steam generated in a mold of this kind. If the steam from the mold and the gas from the core cannot escape readily, a commotion will be set up in the liquid metal and the resulting castings will be permeated with blowholes and dross. As an additional precautionary measure the core should have a vent hole at least 1-in. in diam, and a vent wire should be employed to form a ring of vent holes around each pattern. Before the bottom board is clamped in place, a shallow circular trench is scooped in the sand with passages from the trench leading to the outside of the flask.

Wants Dimensions for Cupola

Q.—We are interested in building a new cupola having an inside diam of approximately 32 in., and would like to have complete specifications for one of standard design. This, of course, would have to include thickness and diameter of shell and windbox; height of stack; size, shape and location of tuyeres, size and height of legs, etc.

A.—While complete details relative to the cupola and its operation may be found in the *Handbook of Cupola Operation*, the following brief data may fill your needs: Shell for a cupola lined to 32 in. should be 46 in. in diam, and formed of ⅜-in. steel plate. Above the charging door the thickness may be reduced to ¼-in. Windbox can be lighter gage steel, say ⅛-in. thick, and may be from 10 to 12 in. wide and about 3 ft high. Cupola should have six equally spaced tuyeres 4⅛ in. high and 6½ in. wide. Height of the tuyeres above the bottom plate may vary according to the thickness of the sand bottom, and the depth of the well or reservoir for holding the iron between taps.

Using a sand bottom 4 in. thick and a well 12 in. deep to hold 1000 lb of iron or two 500-lb charges, the bottoms of the tuyeres should be 22 in. above the bottom plate of the cupola. If a rear slag hole is used, it should be about 4 in. below the bottoms of the tuyeres. Height of the cupola from base plate to charging door may be 15 to 18 ft. Height of base from floor level will depend upon the height of the mixing ladle placed in front of the spout, but we do not believe it should be less than 5 ft.

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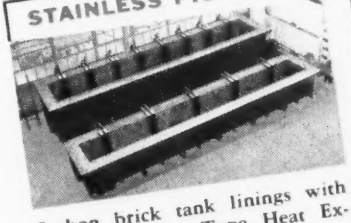

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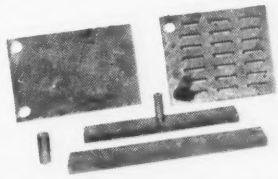

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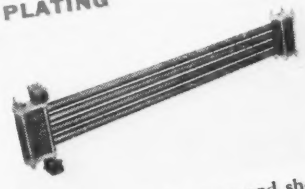
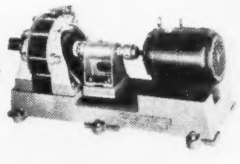


Various immersion-type and shell-and-tube type "Karbate" Heat Exchangers are available to suit capacity requirements.

CARBON STEEL PICKLING



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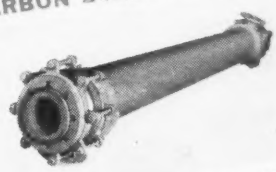

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MEN of Industry

J. E. REHDER has been named director of technology and research, Canada Iron Foundries Ltd., Montreal. Mr. Rehder was graduated from McGill University in 1940 and for the last 5 years has been with the Department of Mines and Technical Survey in Ottawa, Ont. Prior to that he was chief metallurgist, Grinnell Co. of Canada Ltd., Toronto, Ont.

♦ ♦ ♦

Carmen L. Adovasio has been appointed production and technical advisor of the castings division and a director, Cia. Industrial Del Norte, S. A. Saltillo, Coahuila, Mexico. For over 11 years Mr. Adovasio has been metallurgical engineer in charge of production of malleable iron and brass and bronze alloys, Ohio Brass Co., Mansfield, O.

♦ ♦ ♦

J. A. Handley has been named president and a director, Whiting Corp., Harvey, Ill. Mr. Handley, a graduate of University of Kansas, was previously manager of Whiting's branch plant in California. For the past year he has been vice president and chief executive officer of the company. Before joining Whiting he was plant engineer, Douglas Aircraft Co., Long Beach, Calif.

♦ ♦ ♦

Horace A. Deane, formerly operating vice president of the Brake Shoe and Castings Division of American Brake Shoe Co., has been elected a vice president of Campbell, Wyant & Cannon Foundry Co., Muskegon Heights, Mich. He joined American Brake Shoe Co. in 1939 as assistant works manager of the Brake Shoe & Castings Division, became works manager in 1943 and vice president in charge of 18 of the company's plants in 1946. From 1920 to 1939 he was with Deere & Co., Moline, Ill., as a chemist and later as a general metallurgist in the heat treatment of steel. He was director of AFS from 1946 to 1949.

♦ ♦ ♦

Julius F. Mueller, formerly foundry superintendent, Universal-Rundle Corp., Milwaukee, has become foundry consultant for SA Comercio e Industrias, "Souza Noschese," Sao Paulo, Brazil. Mr. Mueller has been associated with Universal-Rundle Corp. for 42 years.

♦ ♦ ♦

W. A. Finn has been named assistant general sales manager of Worthington Corporation, Harrison, N. J., and has returned from Paris, France, where he was serving as general European manager, to assume his new duties in Harrison. A graduate of the Naval Academy in 1922, Mr. Finn served in the Navy until 1926, when he joined Worthington as an application and sales engineer in the steam power division. From 1930 to 1941 he acted as New England district sales manager, then was granted a leave of absence to serve with the Navy until 1946, when he rejoined Worthington as manager of the export department.

♦ ♦ ♦

George J. Earl, for 23 years associate commissioner of the National Metal Trades Association, Chicago, has been appointed commissioner, succeeding **Homer D. Sayre,** who recently retired after 29 years in the position.

♦ ♦ ♦

Frank C. Riecks, Ford Motor Co., Dearborn, Mich., is on special assignment as a consultant to Ford Motor Co. Ltd. to help it rebuild and modernize its iron foundry at Dagenham, England, and revise its foundry op-

(*Continued on page* 122)

J. E. REHDER
. . . Canadian Iron director

CARMEN L. ADOVASIO
. . . adviser-director, Mexico

J. A. HANDLEY
. . . Whiting Corp. president

HORACE A. DEANE
. . . v. p., Muskegon foundry

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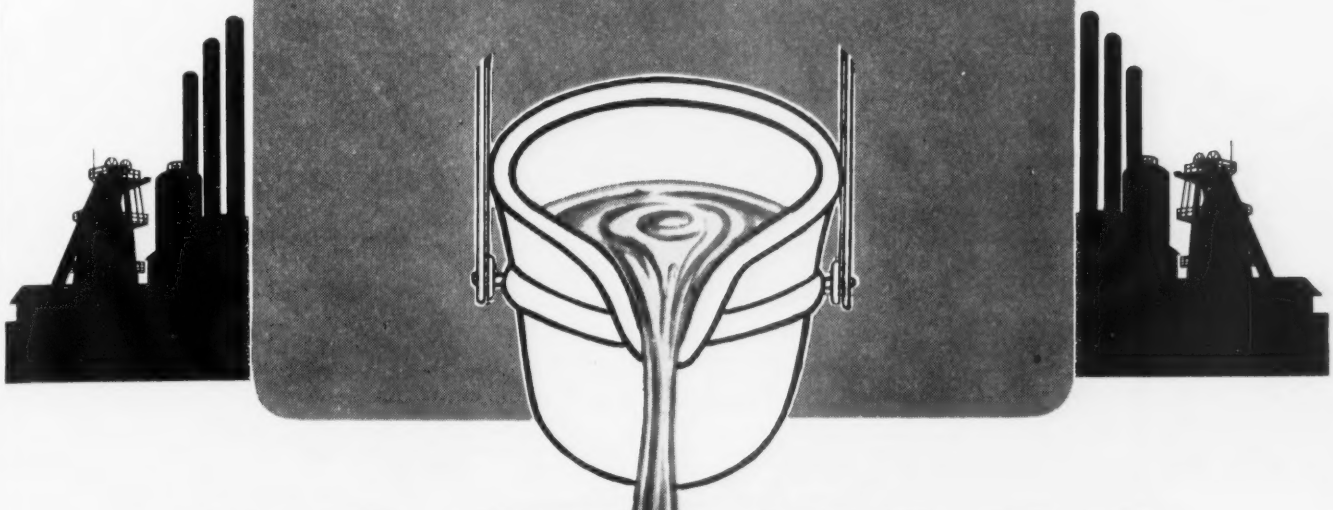
Our Own Source of Ore

Our Own Control of Operations



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MEN of Industry

(*Continued from page* 120)

erations. Mr. Riecks has been with Ford since 1916 when he was a draftsman on plans for the River Rouge plant. He has worked on many of the company's construction programs, including some in China, Japan and France. In 1948 he was appointed manager of foundries for Ford. His most recent assignment was as a project engineer on construction of the Cleveland foundry.

♦ ♦ ♦

James F. McClintic has retired after 32 years of service as a foundryman with General Motors Research Laboratories. Mr. McClintic joined the General Motors staff at Dayton, O., in 1920 after he had served as a molder with Standard Foundry, Dayton, during the four previous years. When Research Laboratories moved from Dayton to Detroit in 1925, he became a member of the staff of the metallurgy department. He served as foundry foreman and specialized in production problems in the General Motors Research experimental foundry.

♦ ♦ ♦

Edward H. Platz Jr., manager of alloy sales, Lebanon Steel Foundry, Lebanon, Pa., has been assigned to the Nickel Section of the Ferro-Alloys Branch, National Production Authority, Washington. Mr. Platz was graduated from Rensselaer Polytechnic Institute in 1916. He was associated with the Duriron Co., Dayton, O., as district manager in its New York, Chicago and Philadelphia offices from 1920-1939, when he joined Lebanon Steel Foundry.

George H. Shrewsbury has been appointed a sales representative for Harbison-Walker Refractories Co. and assigned to the Pittsburgh district. Mr. Shrewsbury was formerly a sales correspondent in Harbison-Walker's Pittsburgh office.

♦ ♦ ♦

Thomas R. Eggert has joined Granite Steel Castings Corp., Granite City, Ill., as assistant to the manager of production. Mr. Eggert was awarded an engineering degree

THOMAS R. EGGERT
. . . *Granite Steel production*

by Massachusetts Institute of Technology in 1950 and supplemented his schooling with experience as a sand technician at Racine Steel Castings Co., Racine, Wis. For the past two years he served with Steel Founders' Society of America as assistant to the technical and research director.

♦ ♦ ♦

Dan Daily and **Richard Lewis** are new district representatives for Frank Hough Co., Libertyville, Ill. They replace **James Suter,** who has become associated with Cornhusker Tractor & Equipment Co., Hough distributor at North Platte, Neb. Mr. Daily will work from Minneapolis and cover North and South Dakota, Minnesota, Iowa, Wisconsin and upper Michigan. He is a mechanical engineering graduate of the University of Minnesota. Mr. Lewis will cover western Missouri, Wyoming, Nebraska, Kansas and Colorado, with headquarters in Kansas City, Mo. A civil engineering graduate of Indiana Technical College, he recently was associated with the Nickel Plate Railroad as a maintenance-of-way engineer.

♦ ♦ ♦

A. T. Peters, foundry superintendent, Dow Chemical Co., Bay City, Mich., has been made assistant manager, Bay City Division of the company. A graduate of the University of Wisconsin with a Master of Science degree in metallurgical engineering, Mr. Peters joined Dow in 1940. He was employed in various capacities in Dow's metallurgical laboratories before becoming foundry superintendent at the Bay City Division in 1947. **C. D. Tucker,** assistant foundry superintendent, has been advanced to foundry superintendent, and **H. E. Elliott** has been named assistant foundry superintendent. Mr. Tucker, who was graduated from Iowa State College with a Bachelor of Science degree in industrial engineering, joined Dow in 1937. Mr. Elliott has a Bachelor of Science degree in chemical engineering from Carnegie Institute of Technology. He joined Dow in 1943.

♦ ♦ ♦

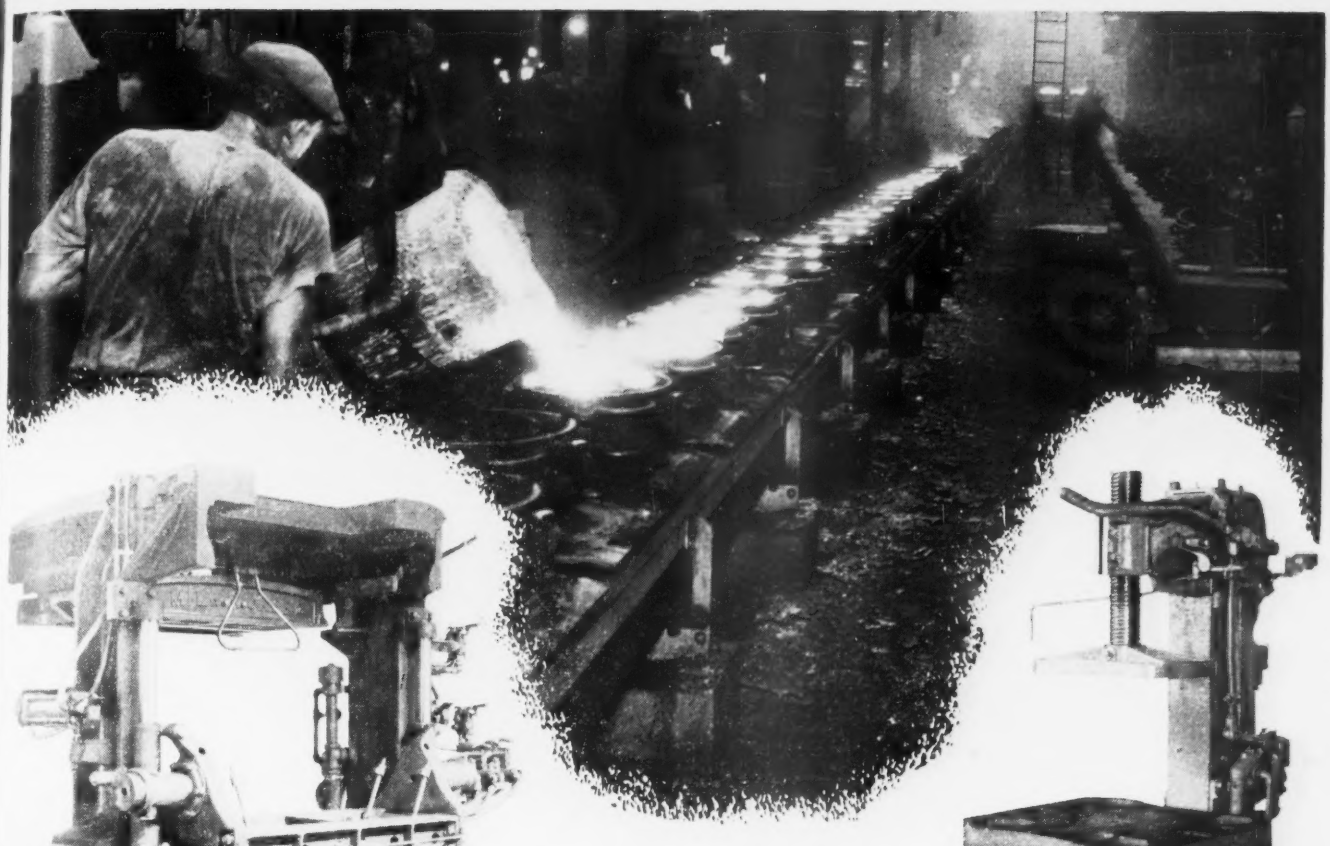
Dr. C. Manning Davis has been appointed head of the analytical section of the Research Laboratory, International Nickel Co., Bayonne, N. J. Dr. Davis was graduated from Mississippi College in 1938, received

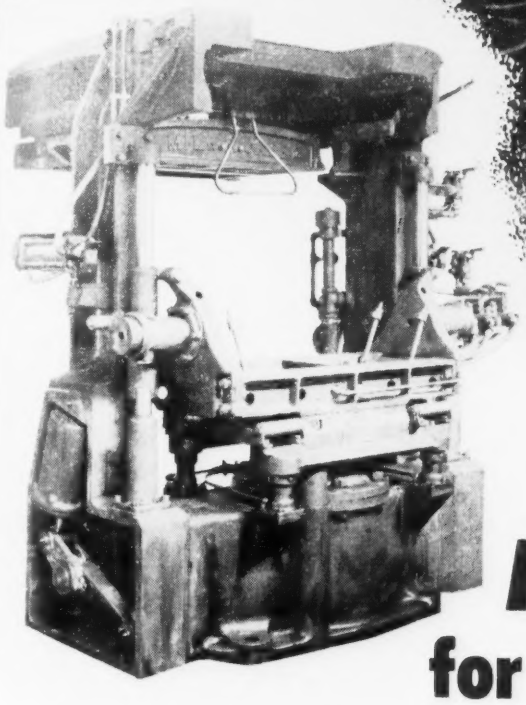
(*Continued on page* 124)

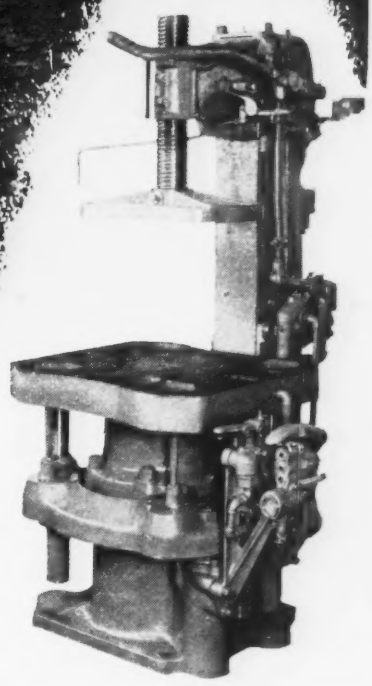
EDWARD H. PLATZ, JR.
. . . *NPA executive*

DAN DAILY
Hough sales, Midwest

RICHARD LEWIS
. . . *Frank Hough sales*







PAIRED for production

DRAGS . . . MODEL 217

This powerful machine combines jolt, squeeze, roll-over and pattern draw in the fastest and simplest possible operating cycle. The completed mold is on a roller conveyor which registers with a run-off conveyor so that the mold is quickly pushed away from machine . . . saves time and crane capacity. **MODEL 217** has a 24,000-pound squeeze and 1200-pound jolt on 80 p.s.i. pressure . . . handles flasks up to 41 inches long and 35 inches wide. Pattern draw is 12 inches. TWO OTHER MODELS HAVING JOLT CAPACITIES OF 1000 AND 1800 POUNDS ARE AVAILABLE.

COPES . . . MODEL 195

This jolt, squeeze, pin-stripper is engineered for high-speed production of uniformly accurate molds . . . handles many difficult jobs with simple pattern equipment. Lifting pins are mounted on a rigid integral member that is guided by two large hardened-and-ground guide pins. **MODEL 195** has a squeeze capacity of 22,500 pounds and a 3000-pound jolt on 80 p.s.i. pressure. Jolt table measures 28 x 39 inches, and pattern draw is 10 inches. SIX OTHER MODELS WITH JOLT CAPACITIES RANGING FROM 650 TO 3000 POUNDS ARE AVAILABLE IN THIS SERIES.

FROM THE SMALLEST TO THE LARGEST . . . THERE'S A SPO-MILWAUKEE FOR EVERY MOLDING JOB

509-SI

Whatever your production schedule, there is a size and type to meet your needs. Every **SPO-MILWAUKEE** machine is foundry-engineered to assure (1) high-speed production, (2) accuracy and uniformity, (3) simple operation, and (4) maximum safety. These well-known qualities have made **SPO** the world's largest supplier of molding machines!

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SPO MILWAUKEE *Foundry Equipment Division*

CASTINGS ARE PERMANENT

6449 GRAND DIVISION AVENUE • CLEVELAND 25, OHIO

MEN of Industry

(*Continued from page* 122)

his master's degree from Tulane University in 1940 and his Ph D degree from University of Pittsburgh this year. He was in charge of the Elgin Watch Co. fellowship at Mellon Institute for Industrial Research from 1947 until last July. Prior to that he was in charge of the analytical laboratory, Fisher Scientific Co., Pittsburgh, for over 5 years.

♦ ♦ ♦

Morris and **Xarifa Bean** were named honorary doctors of science by Antioch College at commencement ceremonies recently in Yellow Springs, O. They were cited for their outstanding contributions in scientific advancement of precision casting of metals. Mr. Bean became manager of the college foundry while a student at Antioch in 1928 and, upon his graduation in 1930, undertook full-time management. In 1931 Xarifa Sallume was graduated from Antioch and, following her marriage to Mr. Bean, joined him in his work. She now heads research and development. General Motors Corp. bought the foundry from the college in 1940, and in 1945 Mr. and Mrs. Bean and other officers of the company bought back the business and have operated it as an independent industry. A second plant has been opened in Cedarville, O.

♦ ♦ ♦

R. H. Morse III has been appointed general manager of the Beloit, Wis., works, Fairbanks, Morse & Co., Chicago, succeeding **Orren S. Leslie** who has been named manager of manufacturing in Chicago. Mr. Morse, great grandson of the company's founder, was graduated from Princeton University and, following Navy srvice, joined the company in 1946. For several years he has been assistant general manager. Mr. Leslie, who joined the company last year, has been in the heavy equipment industry for over 20 years.

♦ ♦ ♦

Joseph G. Risney, elected president of the Wisconsin Chapter of the AFS for 1952-53, is co-owner of Risney Foundry Equipment Co., Milwaukee, representative for International Molding Machine Co., La Grange Park, Ill., National Engineering Co., Chicago, Modern Equipment Co., Port Washington, Wis., and Foundry Equipment Co., Cleveland. Mr. Risney, a native of Iowa was educated there and in 1916 moved to Wisconsin where he was a patternmaker apprentice, later becoming a coremaker and molder. Following several years in supervisory positions in foundries and pattern shops, he joined International Molding Machine Co., Chicago, in 1936, as representative in Michigan, later moving to Milwaukee where he represented the company in Wisconsin, Minnesota and Iowa. In 1947, with his son Carl, he organized his own company. He was vice president of the Wisconsin Chapter last year.

JOSEPH G. RISNEY
. . . *Wisconsin AFS president*

♦ ♦ ♦

John W. Pennington has been named executive engineer and head of the technical department recently established by the Metal Products Division, Koppers Co., Pittsburgh. Mr. Pennington was graduated from Kansas State College. He was a research engineer and staff engineer for Caterpillar Tractor Co., Peoria, Ill., from 1939 until 1951 when he became chief engineer of the Piston Ring Department, Koppers Co.

♦ ♦ ♦

Russell L. Brown has become sales manager of the Chicago branch office of the Sonken-Galamba Corp., Kansas City, Kans.

♦ ♦ ♦

George C. Houck has been elected to the newly created position of vice president for operations with Harris-Seybold Co., Cleveland and Dayton, O. He formerly was planning director and assistant to the president. Before joining Harris-Seybold 13 years ago, Mr. Houck was with Perfection Stove Co., Cleveland. **W. Ray Spiller,** former chief engineer, is Harris-Seybold's new vice president for engineering. He was chief engineer of White Motor Co. prior to joining Harris-Seybold in 1939. **Ren R. Perry** is the third of Harris-Seybold's new vice presidents. Formerly general sales manager, he has been elected vice president for sales. Mr. Perry first joined the firm in 1926. **Harry A. Porter,** who joined the company in 1906 and was made vice president in charge of sales in 1938, becomes

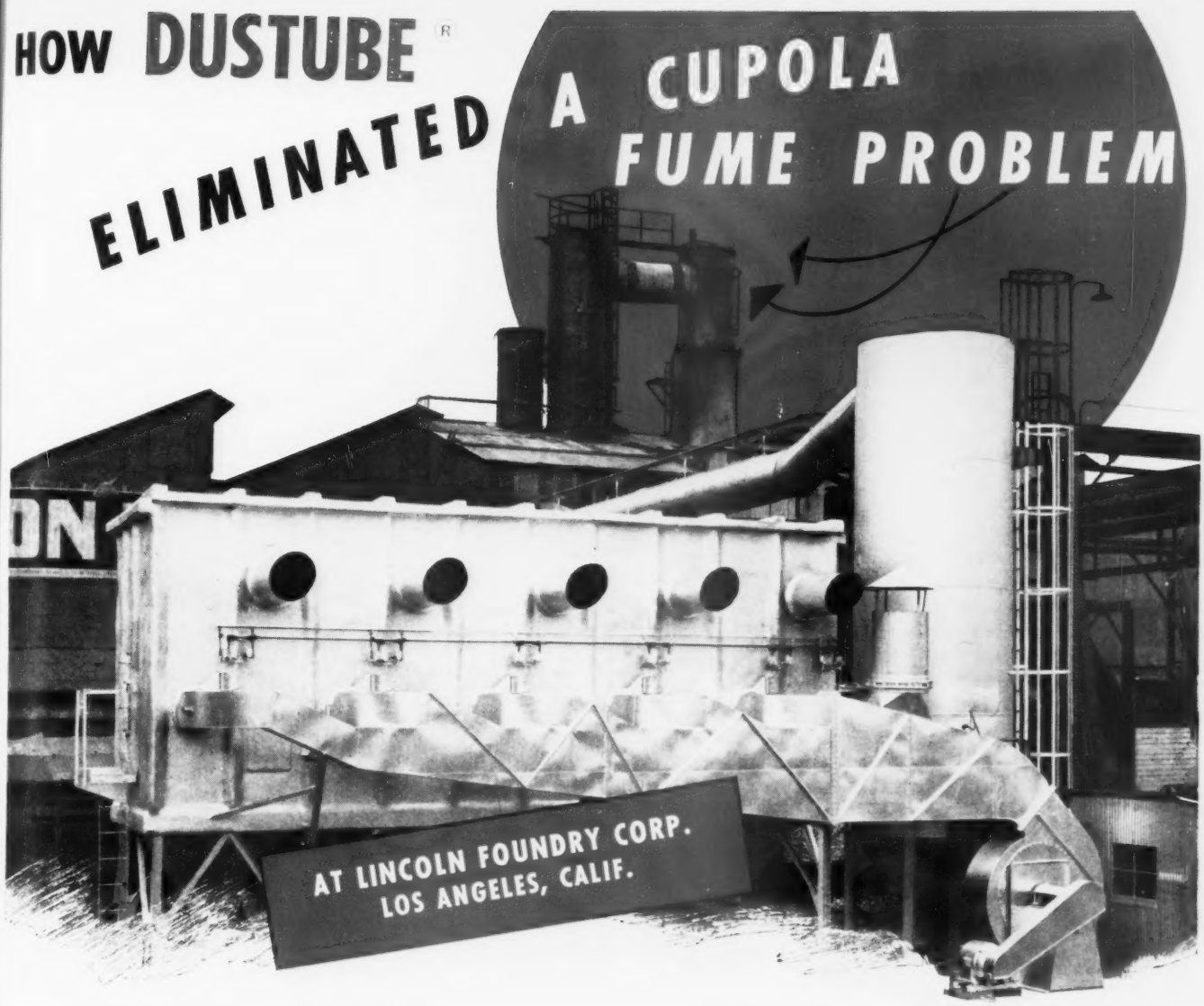
(*Continued on page* 126)

ORREN S. LESLIE
. . . *Fairbanks Chicago mgr.*

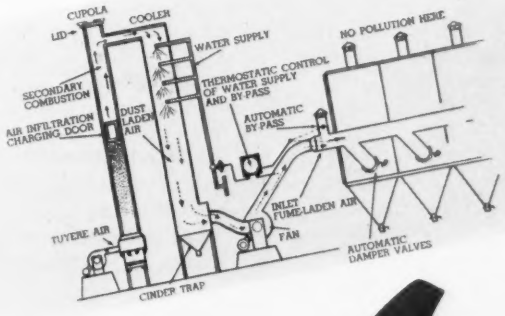
R. H. MORSE III
. . . *Fairbanks Beloit mgr.*

GEORGE C. HOUCK
. . . *Harris-Seybold v. pres.*

HOW DUSTUBE® ELIMINATED A CUPOLA FUME PROBLEM



There is no atmosphere pollution from *this Cupola*—at the Lincoln Foundry Corp., Los Angeles, California. All fume is passed through a Continuous Automatic Dustube Collector where it is filtered so efficiently there is no visible discharge. The installation has received a certificate of approval from the Los Angeles County Air Pollution Control District.



Flow chart of a Typical Dustube Cupola Fume Control Application

Use of synthetic filtration fabrics in the Dustube Collector makes it possible to handle cupola gases at a high temperature and the fume is separated from the gases with virtually 100% efficiency. The gases are cooled to filtration temperature by the evaporation of water spray. In spite of the water cooling, there is no evidence of condensation in the collector and fume is collected in a dry, free-flowing state.

Lincoln Foundry's selection of the Dustube System was based on these important features:

1. LOWER INITIAL INVESTMENT
2. CONTINUOUS OPERATION WITH AUTOMATIC SHAKING, NO MANUAL LABOR
3. REQUIRES A RELATIVELY SMALL AMOUNT OF SPACE
4. MAXIMUM FILTER TUBE LIFE

You can solve your cupola fume problem more efficiently at lower cost with a Dustube — Get complete details today.

American

WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka, Ind.

dustube® COLLECTORS

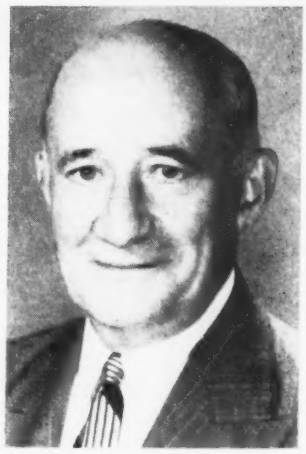
MEN of Industry

(*Continued from page* 124)

Harris-Seybold's senior vice president. **Charles W. Harrold,** who also joined the firm in 1906 and has been vice president in charge of engineering since 1947, continues as a vice president.

♦ ♦ ♦

J. D. Swain and **E. H. Mangan** have been appointed executive vice presidents Electro Metallurgical Co., division of Union Carbide & Carbon Corp., New York. Mr. Swain, a graduate of DePauw University, joined the parent company in 1915. In 1927 he became vice president of Union Carbide Sales Co. and in 1935 vice president-sales, Electro Metallurgical Co. Mr. Mangan was graduated from Massachusetts Institute of Technology in 1913 when he joined Electro Metallurgical Co., and has been vice president since 1944. He is also president of Carbide Power Co. and vice president and director of a number of Union Carbide metallurgical subsidiaries in Canada.



J. D. SWAIN
. . . *Electro vice president*

E. H. MANGAN
. . . *Electro vice president*

♦ ♦ ♦

George J. Bruyn, manager, Niagara sales office, Hooker Electrochemical Co., on Aug. 1 was appointed chief of the Alkalies Section, Inorganic and Agricultural Chemicals Branch of the Chemical Division, National Production Authority.

♦ ♦ ♦

J. W. Zinss has been named vice president in charge of operations, the Duraloy Co., Scottdale, Pa. Mr. Zinss, who has been with the company several years, was assistant to the general manager and more recently general manager. He has had wide experience in the foundry industry in United States and Europe.

♦ ♦ ♦

Schaeffer E. Specht has been appointed executive sales engineer, Research Corp., maker of precipitation equipment for recovery of dust, fog, fly ash and mists from industrial gases, with headquarters at its plant in Bound Brook, N. J. Mr. Specht attended Penn State College and Lafayette College. He was formerly plant engineer for C. K. Williams & Co., Easton, Pa., and design engineer for Penn-Dixie Cement Corp., Nazareth, Pa.

♦ ♦ ♦

Arthur C. Bryan has been appointed vice president in charge of sales, National Carbon Co., division of Union Carbide & Carbon Corp., New York. Mr. Bryan was graduated from University of Nebraska and was associated with General Electric Co., Schenectady. In 1935 he joined National Carbon and was in sales offices in New York, Cleveland, and Kansas City, Mo. He became general sales manager in 1949.

♦ ♦ ♦

Eugene J. Ash, formerly connected with the Ohio Malleable Iron Co., Columbus, O., now is associated with Conexiones Nacionales S.A., Monterrey, Mexico. He was graduated from Heidelberg university, Tiffin, O., in 1925, and received a master of science degree from Ohio State university, Columbus, O., in 1927. From 1927 to 1929 Mr. Ash was metallurgist for Ohio Brass Co., Mansfield, O., and then was engaged in research at the National Bureau of Standards, Washington, until 1933. He joined the Naval Gun Factory, Washington, as assistant metallurgist, and in 1935 became associate metallurgist, Watertown Arsenal, Watertown, Mass. From 1936 until 1941 Mr. Ash was associate professor in charge of teaching foundry metallurgy at the University of Michigan, Ann Arbor, Mich., and then was appointed metallurgical engineer for the Argentine Navy, Buenos Aires, where he served until 1947. Following that he acted as consulting engineer for six ferrous and nonferrous foundries in Buenos Aires, and returned to this country in 1950 where he later joined the Ohio Malleable Iron Co.

♦ ♦ ♦

A. E. Bottenfield, until recently vice president in charge of distributor sales of Whiting Corp., Harvey, Ill., has been elected a vice president of Waldie & Briggs Inc., Chicago.

♦ ♦ ♦

K. C. Gardner Sr. has been elected chairman and chief executive officer, United Engineering & Foundry Co., Pittsburgh, succeeding the late **F. C. Biggert Jr.** **Geoffrey G. Beard,** for-

(*Continued on page* 128)

J. W. ZINSS
Duraloy vice president

ARTHUR C. BRYAN
National Carbon sales

Accurate

SINGLE IMPRESSION DUMP BOX

Best...and Least Expensive

Master core plug pattern and ribbing frame.

Providing for metal thickness with clay sheets.

The "as cast" core box.

It is obvious to an experienced pattern engineer that this master core plug pattern can be constructed more accurately and in less time than a carved cavity.

You may be sure that aluminum castings made in plaster molds are not only more accurate but will require less finishing time.

You will profit both ways by using this modern method.

Send for new illustrated brochure.

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Telephone: Auburn 2683

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Telephone: HIlltop 2-7130

NORMAL, ILL.
Clarence C. Schmidlin
Telephone: Normal 8551-5

LOS ANGELES, CALIF.
McGowan Company, Inc., Telephone: Trinity 2057

MEN of Industry

(*Continued from page* 126)

merly executive vice president, has been named president and general manager. **K. C. Gardner Jr.** has become executive vice president, continuing in charge of plant operations. **Maurice P. Sieger** has been appointed vice president-senior engineer in charge of engineering and research activities.

♦ ♦ ♦

Byron G. MacNabb has joined the Research & Development staff of Alloy Engineering & Casting Co., Champaign, Ill., as associate director. His primary concern will be the coordination of all armed services research and development projects. For the past two years Mr. MacNabb has been assistant to the director of research, Pullman Standard Car Mfg. Co., Hammond, Ind. Earlier he was assistant to the director of research, Atomic Weapons Development Laboratory (Sandia Corp.), Albuquerque, N. M. During World War II, he served as a lieutenant commander in the U. S. Naval Reserve and was associated with guided missile programs and served as assistant to the technical director, Naval Ordnance Test Station, Inyokern, Calif. Prior to entering the Navy, he was in the blast furnace department of Carnegie-Illinois Steel Co., South Chicago, Ill.

♦ ♦ ♦

Bernard Pratte has been appointed general sales manager, Harnischfeger Corp. Milwaukee, supervising all domestic divisions in Milwaukee except welding products. Mr. Pratte, who has been Pittsburgh district sales manager since 1946, also heads domestic branch offices exclusive of Pacific division.

♦ ♦ ♦

Frank A. Hayden has resigned as vice president in charge of sales, Indiana Steel Products Co., Valparaiso, Ind.

♦ ♦ ♦

Thomas W. Russell, Jr. has been appointed general purchasing agent of American Brake Shoe Co., New York. Mr. Russell joined American Brake Shoe Co. in 1945 and served for 4 years in the operating department. In 1949 he entered the purchasing department as a buyer and in 1950 became assistant general purchasing agent.

William Adams has joined Eastern Clay Products Department, Industrial Minerals Division, International Minerals & Chemical Corporation, Chicago, as a sales engineer. Mr. Adams, who had been with Albion Malleable Iron Co., Albion, Mich., since 1940, except for the war years from 1943 to 1946, will work in the Michigan territory, servicing both the refractory and bonding clay operations of Eastern Clay Products. He succeeds **William Woodman,** who has been transferred to Indiana as senior salesman. Mr. Woodman, previously sand control engineer for Pontiac Motors, joined Eastern Clay Products in 1948.

♦ ♦ ♦

C. I. Carey, Peerless Foundry Co. executive, Indianapolis, has been elected president of the Indianapolis Association of Credit Men.

♦ ♦ ♦

William Hoppman has been appointed superintendent of the sand foundry, Cleveland Works, Aluminum Co. of America. Mr. Hoppman was graduated from University of Pittsburgh and joined the company in 1940. In 1947 he became chief industrial engineer of L-Plant and a year later helped establish the sand foundry's plaster cast department. He has been assistant superintendent of L-Plant since 1948.

♦ ♦ ♦

J. L. Reid has been appointed district manager in Salt Lake City, Utah, for sales of mechanical goods, Goodyear Tire & Rubber Co., Akron, O., succeeding **W. T. Roberts** who has retired following 32 years of service.

♦ ♦ ♦

Walter S. Schamel has been appointed district manager of the Los Angeles office, American Wheelabrator & Equipment Corp., Mishawaka, Ind., with offices at 3155 Leonis Blvd., Vernon, Los Angeles 58. Mr. Schamel, a graduate of Missouri School of Mines and Metallurgy, for the past 6½ years has been in the company's dust and fume control division in the home office, as sales engineer and more recently as assistant technical director.

♦ ♦ ♦

F. D. Weatherholt has been named sales manager of industrial products, Westinghouse Electric Corp., Pittsburgh. Mr. Weatherholt joined the company in 1921 following graduation from University of Kentucky. Following sales work in East Springfield, Mass., Albany, and New York, he was transferred to Pittsburgh in 1948 as assistant industrial manager, becoming manager of the Apparatus Division's industrial department the following year.

♦ ♦ ♦

Irvin E. Frye has been appointed manager of the Foundry Division, Fischer & Associates, consulting en-

(*Concluded on page* 130)

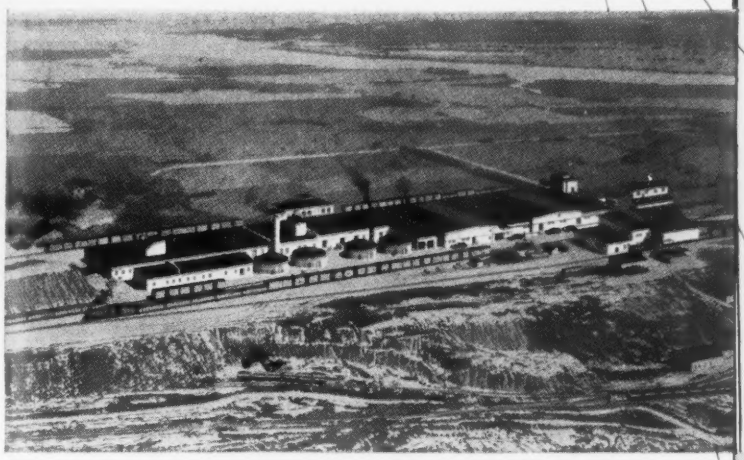
BYRON G. MacNABB
. . . *Alloy research*

THOMAS W. RUSSELL, JR.
. . . *Brake Shoe purchasing*

WILLIAM ADAMS
. . . *Eastern Clay sales*

WALTER S. SCHAMEL
. . . *Wheelabrator office mgr.*

ILLINOIS CLAY PRODUCTS HAS ALL 3



1 Central Location

The Illinois Clay Products Company, Goose Lake Plant, is located near Joliet, Illinois—only 55 miles from Chicago. Above is a map showing the excellent shipping facilities provided by the Elgin, Joliet & Eastern Railway—the Outer Belt Line.

2 Ample Supply and Modern Plant

At Goose Lake, extensive deposits assure an ample source of fire clay for many years ahead. This large modern plant employs all the latest methods in the manufacture of refractories and insulation and many advanced and special techniques have enabled us to supply better products than are obtainable elsewhere.

Chem-Brix
Pat. Applied for
CHEMICALLY BONDED REFRACTORIES

GOOSE LAKE
FIRE CLAY BRICK AND CLAYS

3 Quality Products

For over 40 years, Illinois Clay Products Company has maintained high standards in quality and uniformity. Research and development have led to constant improvements and new products such as Carbon and Hi-Silica Chem-Brix.

THERM-O-FLAKE
HIGH TEMPERATURE VERMICULITE INSULATION

Illinois Clay Products Company

SINCE 1911 JOLIET, ILLINOIS

MEN of Industry

(*Concluded from page* 128)

gineers, Cleveland. Mr. Frye attended Western Reserve University and during 23 years in foundry design and engineering has been associated with Edwin S. Carman Inc., Arthur G. McKee & Co., and Bartlett & Snow Co., Cleveland. Most recently he has been engaged in design and erection of buildings and equipment for an aluminum foundry of Mohawk Foundries Inc., Cleveland.

♦ ♦ ♦

Thomas J. Wood has been appointed operating assistant to the president of Brake Shoe & Castings Division, American Brake Shoe Co., and **Raymond A. Frick** has been appointed general works manager. Mr. Wood joined the firm in 1939 as assistant metallurgist and became superintendent of the Mahwah, N. J., foundry in 1943 and district works manager in 1949. Prior to his new appointment he was chief metallurgist for the division. He is a graduate of Lehigh University and a past chairman of the Metropolitan Chapter of the AFS. Mr. Frick joined the company as an apprentice in 1942, was appointed foundry foreman of the Buffalo plant in 1947 and became superintendent of the North Kansas City, Mo., plant in 1948. Before his new assignment he was district works manager. He is a graduate of the University of Pennsylvania.

♦ ♦ ♦

S. W. Fountain has been elected vice president and a director of Chicago Tramrail Corp., Chicago, which he joined in 1951. He was previously associated with Westinghouse Electric Corp., Pittsburgh.

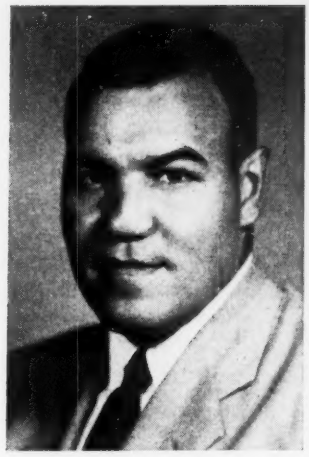
♦ ♦ ♦

Herbert K. Holden has been appointed salesman in the Niagara sales territory, Hooker Electrochemical Co., Niagara Falls, N. Y., comprising western Pennsylvania and New York state exclusive of the metropolitan area.

♦ ♦ ♦

Charles Maynard, director of engineering and research, Indiana Steel Products Co., Valparaiso, Ind., and **John Bouwmeester,** manufacturing manager, have been named vice presidents. **A. Richard Kirsch,** controller, has been appointed treasurer, and **Anthony Astrologes,** assistant secretary, has become assistant treasurer and assistant controller.

THOMAS J. WOOD
. . . Brake Shoe executive



RAYMOND A. FRICK
. . . Brake Shoe works mgr.

F. O. Humberger has been elected president, Massillon Steel Casting Co., Massillon, O.

♦ ♦ ♦

Alexander C. Hauck has been appointed Cleveland district sales representative, Vesuvius Crucible Co., Swissvale, Pa.

♦ ♦ ♦

Thomas M. Ware has been elected vice president in charge of the engineering division, International Minerals & Chemical Corp., Chicago. **Edward D. McDougal Jr.** has been elected vice president and will continue as general counsel. **C. M. Edwards** succeeds Mr. McDougal as secretary.

♦ ♦ ♦

Paul B. Foxwell has been appointed abrasive engineer by Norton Co., Worcester, Mass., succeeding Frederick L. Anderson, resigned, and will be responsible for western Missouri, eastern Kansas and Oklahoma. Mr. Foxwell was graduated from Virginia Polytechnic Institute in 1950 with a Bachelor of Science degree in industrial engineering.

♦ ♦ ♦

John Deaderick has been named manager Philadelphia office, Foxboro Co., Foxboro, Mass. After receiving his engineering training at Texas A & M, Mr. Deaderick served as industrial engineer at Foxboro branches in Corpus Christi, Tex., and Baton Rouge, La., and as manager of the Tulsa, Okla., branch. **Joseph Esherick,** for many years district representative of Foxboro Co. in Philadelphia, will manage special accounts.

♦ ♦ ♦

S. D. Mullikin has been appointed manager, administrative department, Engine and Foundry Division, Ford Motor Co., Cleveland. Mr. Mullikin joined the Highland Park plant in 1925 and had been superintendent of the Henry Ford Trade School. This school closed recently following 36 years of training men for technical jobs, its functions being taken over by the Dearborn Board of Education.

♦ ♦ ♦

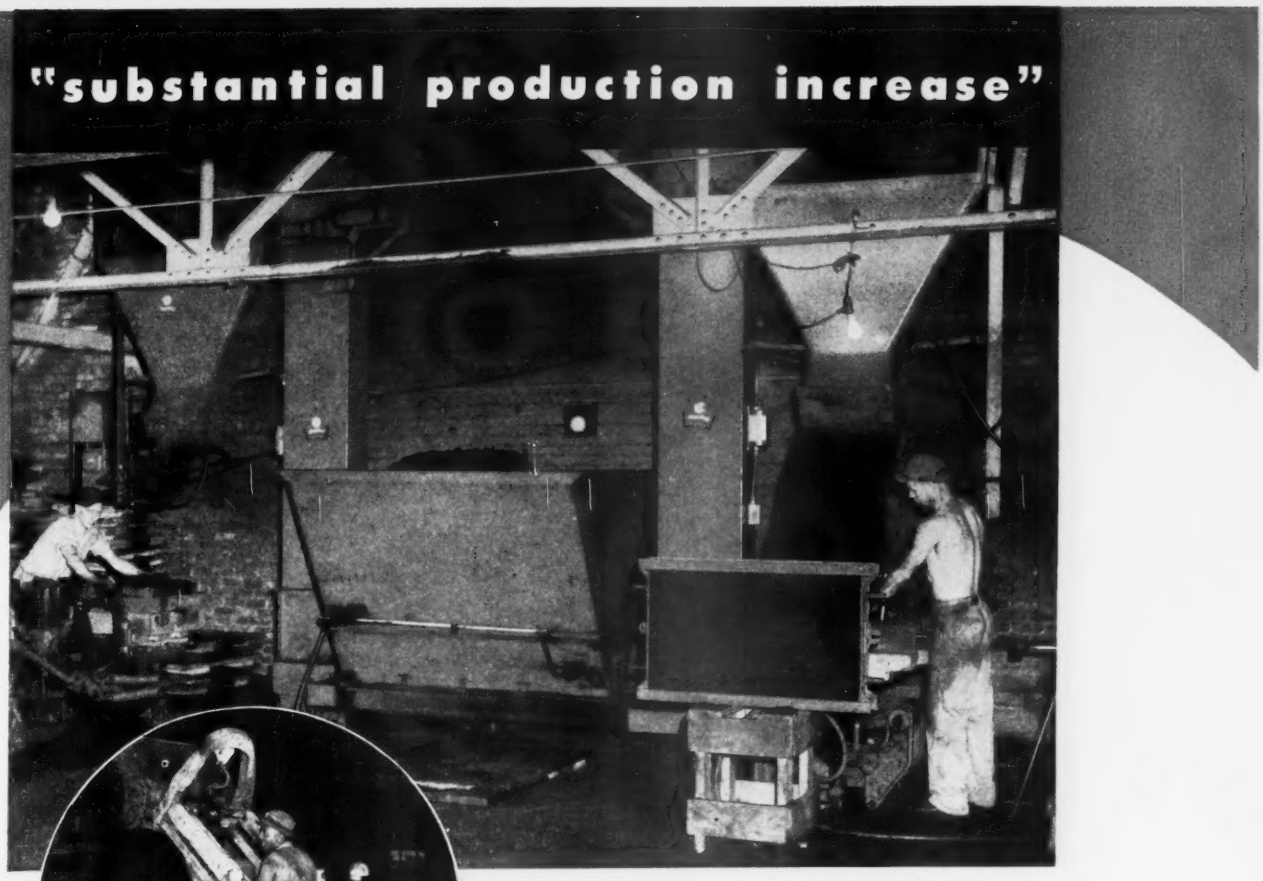
Howard K. Chapman has been named executive vice president, H. Kramer & Co., Chicago. **Emanuel Singer** has become vice president in charge of purchasing, and **E. S. Schwartz,** vice president and general works manager of the Chicago, Philadelphia and Los Angeles plants.

Dupont Observes 150th Anniversary

In commemorating the 150th anniversary of the founding of the company on July 19, 1802, E. I. du Pont de Nemours & Co., Wilmington, Del., has published a beautiful book entitled "Du Pont, The Autobiography of an American Enterprise." Eluthere Irenee du Pont arrived in America on New Year's Day 1800, and because he knew something about powdermaking, and the young nation with its rugged frontiers provided a heavy demand for explosives, he undertook the building of a mill on the banks of the Brandywine near Wilmington. While the new industry constantly faced financial difficulties, the enterprise grew. One of the interesting features of this company is the curiously modern ideas of its founder on how a business should be operated.

With a wide variety of illustrations, many of them in full color, this book goes on to describe the important periods in the history of the company as follows: America on the March 1834-1830; The Civil War 1861-1865; Industrial Expansion 1865-1902; The Modern Corporation 1902-1914; World War I 1914-1918; New Frontiers 1919-1939; Global War 1939-1945; DuPont Today.

"substantial production increase"



...results from use of

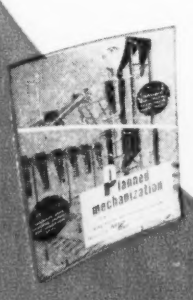
HANDY SANDY

on roll over work

PEERLESS FOUNDRY COMPANY, Cincinnati, Ohio, has reduced their cost per casting through use of the Handy Sandy to convert shoveling time into molding time. "The Handy Sandy's," says Stephan F. Dana, President, "have increased our production substantially which, of course, is important. However until we had these units there were certain jobs that required so much sand shoveling that it was injurious to the molders and they were constantly complaining. Since the installation of these units we do not have this difficulty and because the work is so much easier for the men the attendance records are a great deal better."

Both Handy Sandy Units are fed from a central hopper which is filled by a Payloader. They lift the sand overhead where it is available to the molders without bending or effort . . . enabling them to devote full time to molding.

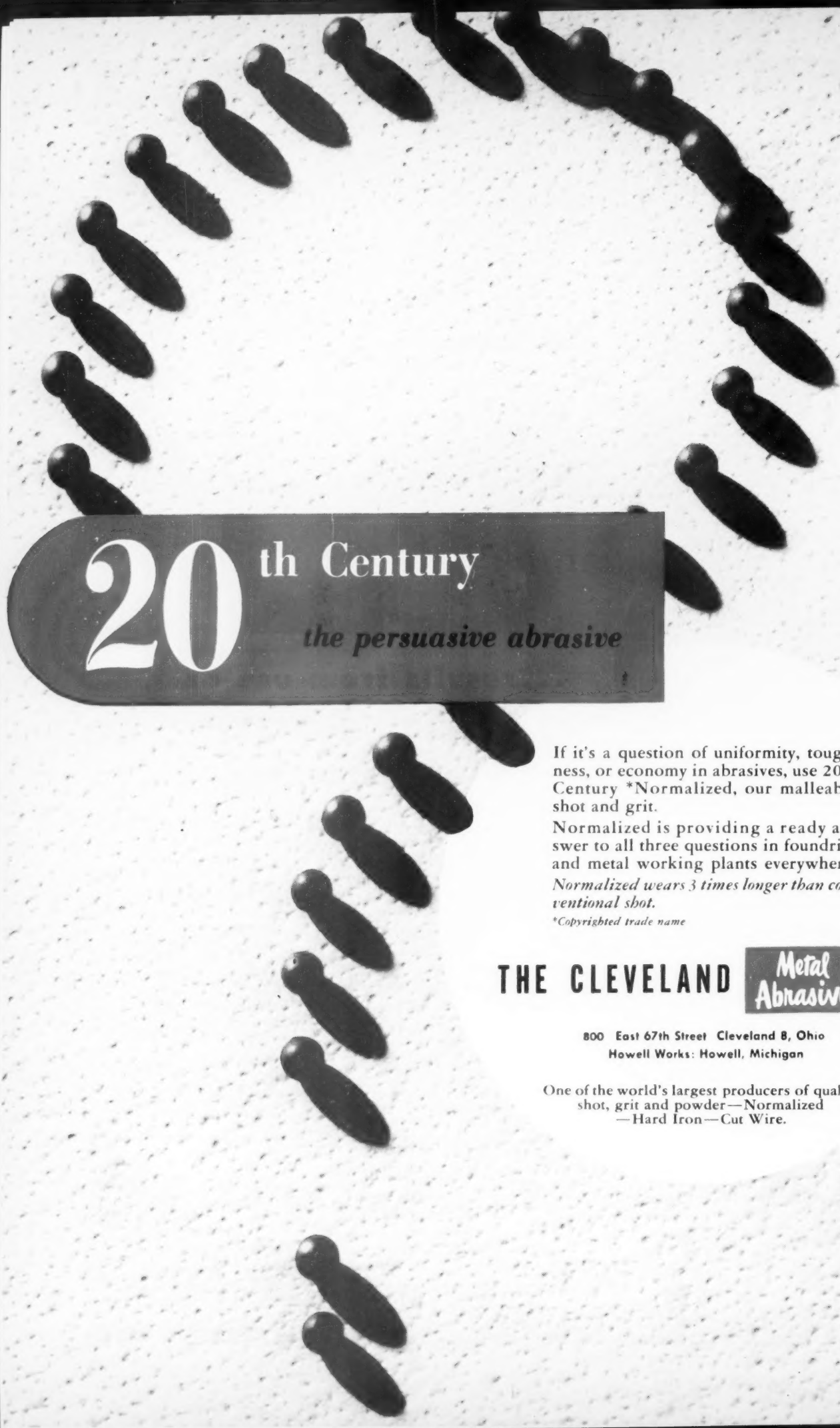
Because of the highly satisfactory performance of their Handy Sandy installation, Peerless Foundry has since ordered a second compound unit as shown above.



The advantages of the Handy Sandy are graphically described in a complete new catalog "PLANNED MECHANIZATION FOR FOUNDRIES." This 20-page manual shows how the Handy Sandy combines with the Reddy Sandy portable shakeout and sand preparing unit to eliminate all shoveling from the shakeout, sand preparing and molding cycle. SEND FOR YOUR FREE COPY TODAY.

NEWAYGO ENGINEERING COMPANY NEWAYGO, MICHIGAN

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment



If it's a question of uniformity, toughness, or economy in abrasives, use 20th Century *Normalized, our malleable shot and grit.

Normalized is providing a ready answer to all three questions in foundries and metal working plants everywhere.

Normalized wears 3 times longer than conventional shot.

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THE CLEVELAND Metal Abrasive CO.

800 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan

One of the world's largest producers of quality shot, grit and powder—Normalized —Hard Iron—Cut Wire.

Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	920,502	512,192	.....
1951			
May	101,345	61,373	274,954
5 mo.	483,252	289,430	.....
June	94,376	57,176	258,144
July	76,826	45,072	263,017
Aug.	90,727	57,164	249,273
Sept.	82,276	48,568	244,575
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,083,545	654,380	.....
1952			
Jan.	87,003	54,988	202,799
Feb.	82,898	50,129	193,061
Mar.	80,960	49,084	196,896
Apr.	89,270	56,337	198,215
May	81,770	51,476	180,382
5 mo.	421,901	262,014	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1950	543,082	184,782	181,366	167,201	.....
1951					
May	40,487	14,798	13,400	11,692	112,638
5 mo.	255,982	91,333	86,900	73,608	.....
June	35,961	13,853	10,323	10,850	112,760
July	27,426	10,739	7,142	8,693	119,461
Aug.	35,531	14,128	10,922	9,526	117,888
Sept.	32,487	13,086	8,829	9,730	122,973
Oct.	35,222	13,950	10,131	10,297	110,382
Nov.	32,367	12,728	8,816	9,926	116,044
Dec.	30,799	12,587	8,387	8,441	112,479
Total	436,049	164,731	131,258	129,404	.....
1952					
Jan.	46,424	18,051	12,236	13,884	109,654
Feb.	44,847	17,451	13,445	13,012	110,327
Mar.	46,448	19,017	13,673	12,880	104,749
Apr.	49,821	19,451	14,631	14,482	104,004
May	47,752	18,317	14,292	13,907	100,802
5 mo.	352,866	92,287	68,277	68,165	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[2]
1950	1,056,973	953,590	55,614	.....
1951				
May	109,881	95,049	5,986	84,002
5 mo.	538,418	484,229	31,777	.....
June	98,559	88,818	5,358	83,518
July	76,551	69,334	4,064	85,837
Aug.	94,443	84,720	5,097	84,821
Sept.	85,433	76,304	5,161	84,611
Oct.	94,706	84,544	5,845	82,491
Nov.	87,764	78,640	5,661	82,667
Dec.	76,526	69,653	4,639	80,435
Total	1,131,402	1,018,973	65,808	.....
1952				
Jan.	89,616	80,376	6,233	78,316
Feb.	86,231	77,813	5,204	75,279
Mar.	88,642	79,437	6,182	72,463
Apr.	84,460	75,590	5,914	70,602
May	81,903	73,723	5,420	70,252
5 mo.	430,852	386,939	28,953	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	15,224	13,310	.....
1951			
May	2,987	2,607	12,867
5 mo.	13,283	11,718	.....
June	1,758	1,642	14,331
July	1,676	1,557	15,528
Aug.	2,270	2,135	16,095
Sept.	2,010	1,931	16,407
Oct.	2,371	2,300	16,143
Nov.	2,774	2,461	15,550
Dec.	2,220	2,098	14,729
Total	25,583	24,089	.....
1952			
Jan.	3,569	3,083	14,047
Feb.	3,368	2,940	14,459
Mar.	3,319	2,972	13,279
Apr.	3,051	2,751	13,159
May	3,001	2,698	13,041
5 mo.	16,308	14,444	.....

Foundry Production Workers

Estimated Number

	May 1952	Apr. 1952	May 1951
Gray Iron	144,900	145,700	162,600
Malleable	25,900	26,100	28,100
Steel	67,900	66,900	62,200
Nonferrous	95,000	94,500	93,200

Average Weekly Earnings

	May 1952	Apr. 1952	May 1951
Gray Iron	$68.97	$68.39	$70.58
Malleable Iron	72.12	69.42	74.04
Steel	76.93	75.14	74.81
Nonferrous	75.25	75.11	74.07

Average Weekly Hours

	May 1952	Apr. 1952	May 1951
Gray Iron	40.1	39.9	42.7
Malleable Iron	40.0	38.9	42.6
Steel	42.5	41.7	42.7
Nonferrous	40.7	40.8	42.4

Labor Turnover Rate (Apr.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	4.0	4.7	2.5	1.4
Malleable Iron	4.0	5.1	3.3	1.0
Steel	5.5	5.2	3.8	.4
Nonferrous	6.0	5.6	3.0	1.9

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

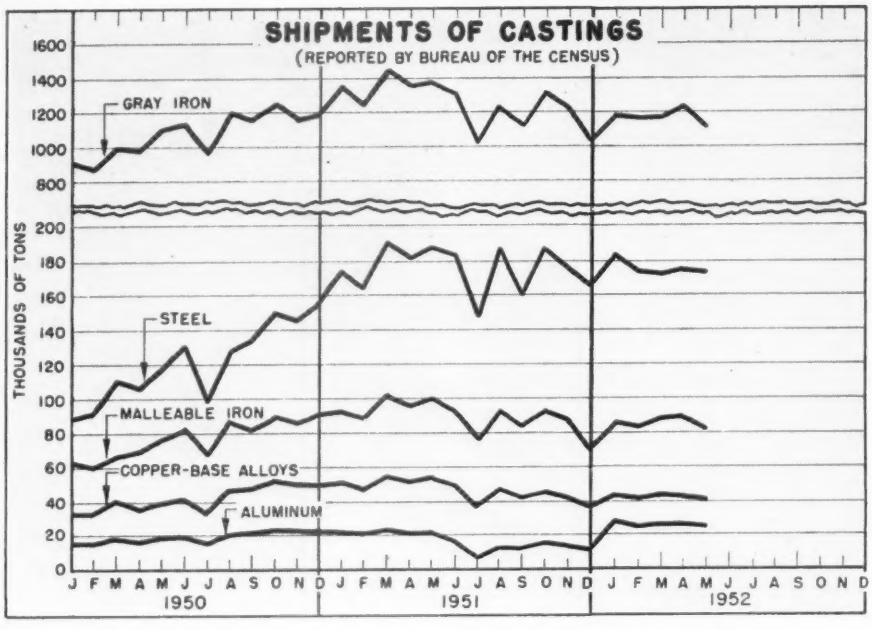
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Chilled Railroad Car Wheels—For Sale	Pressure Pipe & Fittings Total[2]	Soil Pipe & Fittings Total[2]	Unfilled Orders[3] Total
1950	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
May	1,396,651	796,468	898,328	419,365	225,129	112,145	65,721	57,485	139,854	67,619	2,228,780
5 mo.	6,798,638	3,828,964	4,387,850	2,026,812	1,097,424	528,493	301,465	261,760	666,778	345,121	.....
June	1,308,987	742,794	847,024	395,329	216,620	108,042	58,620	52,700	121,851	64,872	2,162,152
July	1,028,812	568,126	653,656	301,749	200,764	97,575	40,792	35,202	88,217	45,383	2,208,116
Aug.	1,218,832	697,952	779,838	378,042	222,721	109,257	50,127	44,507	115,284	50,862	2,144,587
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,594	38,119	108,767	31,175	1,847,065
Total	14,987,696	8,449,515	9,571,570	4,469,069	2,624,517	1,257,542	633,996	563,272	1,474,110	699,000	.....
1952											
Jan.	1,199,285	694,498	745,548	359,806	225,704	110,263	57,155	53,551	125,729	45,149	1,800,905
Feb.	1,155,143	654,833	733,067	348,885	219,251	105,918	50,444	47,649	107,669	44,712	1,766,434
Mar.	1,172,017	660,920	723,225	334,492	228,799	110,607	53,919	49,747	115,843	50,231	1,711,037
Apr.	1,204,801	652,962	773,538	347,121	204,805	85,239	48,506	42,650	117,929	60,023	1,614,426
May	1,100,630	620,049	698,332	317,150	186,998	91,980	44,229	39,848	117,586	53,485	1,459,305
5 mo.	5,831,876	3,283,262	3,673,710	1,807,454	1,075,557	1,349,522	254,253	233,445	584,756	263,600	.....

Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[3] Total
1950	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
May	180,188	130,826	39,845	135,645	101,363	35,511	44,543	29,463	4,334	881,702
5 mo.	882,893	635,227	210,756	679,114	502,133	187,099	203,798	132,094	23,557	.....
June	184,424	131,219	42,337	143,201	101,363	35,511	46,031	29,739	4,334	881,702
July	147,251	100,141	27,585	141,538	103,090	38,200	42,886	28,129	4,137	895,054
Aug.	177,096	128,981	41,763	111,964	78,034	24,516	35,287	22,107	3,069	929,978
Sept.	160,695	116,658	35,500	130,913	99,732	36,086	46,183	29,249	5,677	944,211
Oct.	189,929	139,953	39,984	120,632	89,771	33,086	40,063	26,887	2,414	918,038
Nov.	176,728	131,276	35,034	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Dec.	165,110	123,448	33,213	126,544	95,180	31,099	50,184	36,096	3,935	865,029
Total	2,100,970	1,507,179	476,372	119,762	89,298	29,341	45,348	34,150	3,872	846,436
1952				1,583,375	1,162,687	415,955	527,695	344,492	50,457	.....
Jan.	183,738	139,488	37,091							
Feb.	174,626	133,602	31,719	133,985	102,265	31,806	49,753	37,223	5,285	869,299
Mar.	173,694	131,997	32,118	125,484	94,969	28,251	49,142	38,633	3,468	856,872
Apr.	175,075	134,325	33,549	125,787	95,206	27,782	47,907	37,196	4,336	857,115
May	173,635	132,129	35,227	125,309	95,816	30,995	48,326	37,129	4,232	804,695
5 mo.	880,768	671,541	169,704	637,193	485,484	148,632	243,575	187,835	21,072	.....

[1] Source: Bureau of the Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	200.4
Mar.	599.0	310.0
Apr.	490.1	385.1
May	431.7	225.2
June	393.2	353.8
July	390.3	....
Aug.	404.5	....
Sept.	346.5	....
Oct.	372.4	....
Nov.	305.5	....
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1950	72,718,038	73,373,618	3,523,396
1951			
Apr.	6,471,316	6,335,793	357,01[illegible]
4 mo.	25,973,898	25,875,316	1,282,64[illegible]
May	6,730,122	6,716,780	367,94[illegible]
June	6,567,640	6,638,043	324,75[illegible]
July	6,629,863	6,495,585	301,44[illegible]
Aug.	6,768,161	6,674,495	299,02[illegible]
Sept.	6,470,658	6,366,969	274,01[illegible]
Oct.	6,742,767	6,727,211	292,73[illegible]
Nov.	6,501,098	6,562,279	272,33[illegible]
Dec.	6,738,759	6,821,446	249,49[illegible]
Total	79,122,966	78,868,124	3,664,404
1952			
Jan.	6,804,106	6,760,011	261,14[illegible]
Feb.	6,358,715	6,411,905	251,12[illegible]
Mar.	6,779,639	6,743,944	264,48[illegible]
Apr.	5,809,451	5,775,781	264,384
4 mo.	25,751,911	25,691,641	1,041,145

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
Jan.	28,416	28,315
Feb.	27,168	24,211
March	31,997	23,890
Apr.	30,472	22,547
May	33,267	21,740
June	33,817	21,274
July	32,016	.....
Aug.	25,285	.....
Sept.	22,285	.....
Oct.	23,124	.....
Total for year	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	579,332	376,681	.....
1951			
May	48,517	32,657	100,299
5 mo.	232,059	154,985	.....
Total, 1951	450,375	291,796	.....
1952			
Jan.	38,027	24,974	70,262
Feb.	34,307	23,006	70,034
Mar.	35,083	23,443	67,846
Apr.	37,312	23,741	63,768
May	35,775	22,410	62,397
5 mo.	180,504	117,574	.....

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Mar.	5,919.3	267.9	276.5	4,647.5	727.5	5,406	550	33	15
3 mo.	16,805.8	806.6	735.8	13,184.5	2,079.0	15,498	1,584	94	36
Apr.	5,812.2	259.1	261.0	4,575.8	716.1	5,281	516	31	11
May	6,104.9	282.0	259.4	4,777.0	786.5	5,522	533	31	11
June	5,911.3	254.2	276.5	4,631.9	748.7	5,348	486	30	11
July	5,994.8	280.4	250.0	4,702.8	761.6	5,317	378	23	10
Aug.	5,988.6	252.7	254.4	4,723 3	758.2	5,358	465	30	11
Sept.	5,811.6	257.7	243.7	4,576.8	733.4	5,266	431	27	12
Oct.	6,112.6	260.6	299.4	4,777.4	775.2	5,601	489	31	14
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.8	4,672.3	773.1	5,452	466	29	14
Feb.	5,701.8	245.2	261.4	4,496.9	698.3	5,139	441	29	11
Mar.	6,226.2	250.3	273.1	4,895.9	806.9	5,552	433	27	7
3 mo.	17,892.3	728.6	820.3	14,065.1	2,278.3	16,143	910	85	35

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1950	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Apr.	5,987,947	3,013,527	1,029,089	545,897	103,458	37,973	704,416	457,521
4 mo.	23,488,411	11,816,141	4,039,454	2,130,830	423,208	156,484	2,744,994	1,755,339
May	6,096,678	3,087,313	1,063,281	568,198	111,914	39,312	734,483	484,878
June	5,693,402	2,847,856	972,949	517,604	108,740	39,454	693,636	462,092
July	5,298,614	2,581,856	747,864	393,254	80,903	29,858	632,782	421,689
Aug.	5,614,735	2,721,287	918,189	487,085	104,869	37,592	720,020	475,190
Sept.	5,377,491	2,585,665	811,392	427,035	93,166	33,610	688,911	460,418
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,155
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
Jan.	5,847,011	2,788,426	846,891	449,935	101,211	38,150	743,233	470,126
Feb.	5,572,506	2,702,092	789,293	419,279	94,900	35,536	697,319	440,325
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,793	475,161
Apr.	5,360,417	2,657,926	831,066	440,035	106,059	38,888	684,318	427,339
4 mo.	22,682,463	11,008,808	3,261,415	1,725,102	394,921	147,587	2,866,663	1,812,951

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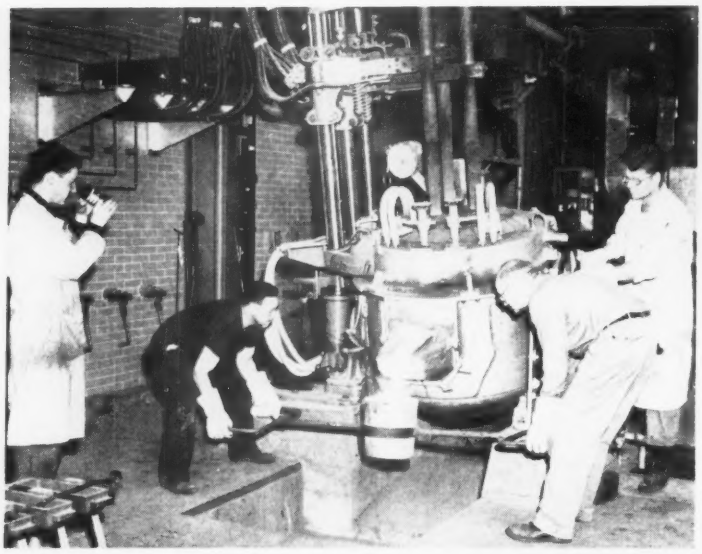
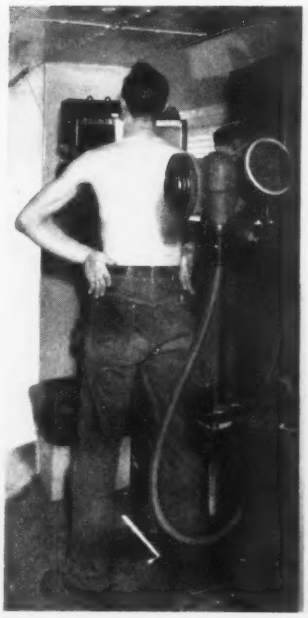
NEWS VIEWS

KEY TO THE CITY: Frank H. Adams, president, Surface Combustion Corp., recently received two awards at the same ceremony. Toledo Mayor Lloyd E. Roulet (left) presented him with a glass key to the city in recognition of the 25th anniversary of Surface Combustion's present Toledo plant and Mr. Adams' activities for the betterment of city. On the same occasion Mr. Adams received a service pin in recognition of his 40 years with Surface Combustion.



NEW LAB: This three-phase, direct-arc furnace, with a capacity of approximately 1700 lb, is the largest furnace in the recently completed General Motors Research Laboratories Metallurgy Department building at the GM Technical Center.



MOBILE X-RAY: One hundred and sixty-eight previously undetected cases of tuberculosis and 13 early chest malignancies have been found among American Brake Shoe Co.'s 10,000 workers since its mobile x-ray unit for employees went on the road 50,000 miles and almost four years ago. It makes annual circuit of the company's 54 plants throughout the country. One technician handles the complete operation of the unit.

APPOINTMENT: Ralph W. Stocking, standing at left, receives the congratulations of Fritz Schnackenberg on his appointment as plant manager of the Beardsley & Piper Division of Pettibone Mulliken Corp., Chicago. Mr. Schnackenberg, whom Mr. Stocking replaces, is leaving the company to take a position with the Nordberg Mfg. Co., Milwaukee. Seated to the right of Mr. Schnackenberg is E. J. Seifert, company president. C. V. Nass, vice president and general manager, is standing at the right.

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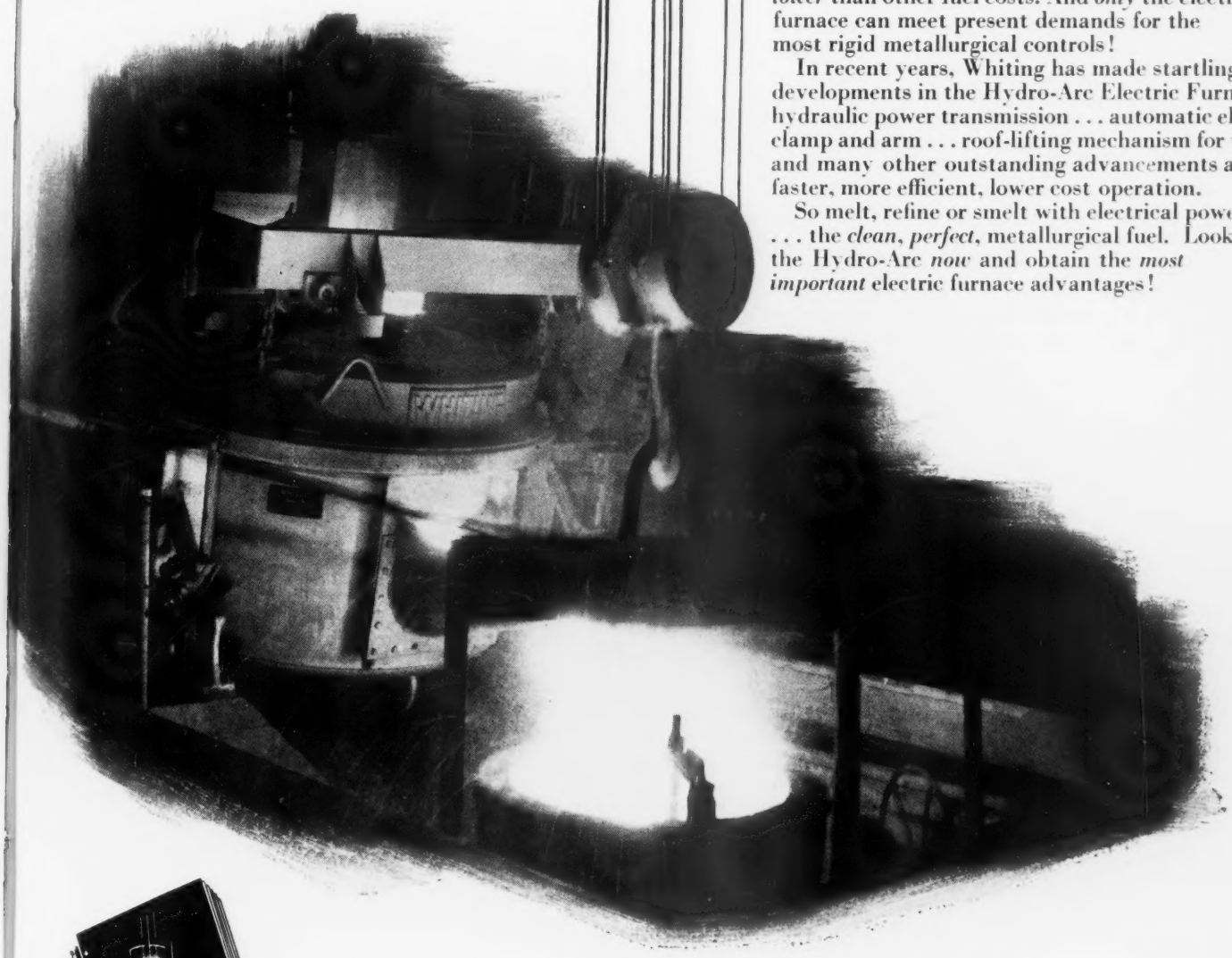

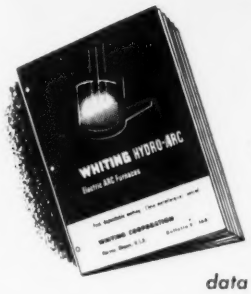

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GRAY IRON foundries are slightly more active, due in part to a mild improvement in business and to an accumulation of orders during periods when plants were closed for mass vacations.

Upward trend is expected to continue until well into the fall, reflecting seasonal influences as well as a return to more normal conditions generally throughout the metalworking industries as a result of the final settlement of the steel strike. However, most gray iron foundries are still averaging little better than four days a week. Some are doing five days, but with limited forces. Certain foundries, notably the pressure pipe shops, are operating a full five days.

Steel foundries are the most active of all. They still have large backlogs of work for heavy machinery and other capital goods equipment; also substantial rearmament business. These shops are operating five days a week and longer in various cases. Backlogs average 15 weeks or more.

Activity in malleable castings still is lagging. However, demands from the automotive and farm equipment industries should pick up once these buyers get sufficient steel to warrant higher operations. Buying by railroads and railroad equipment manufacturers remains slow, with no important improvement indicated for the near future.

The relatively few magnesium shops are actively engaged in defense work, particularly for the aircraft industry. Aluminum production shops also are similarly engaged. Business with the aluminum jobbing foundries, however, is spotty. Brass foundries, equipped to do defense work, are busy, but shops not so equipped operate at a lower rate.

A new 1200-ton blast furnace is scheduled for erection in this district by the Delaware River Steel Corp., a recently organized Delaware corporation, of which John M. Blair, 505 Fifth Avenue, New York, is executive vice-president. The furnace will be erected on river front property leased from the Claymont Division of the Colorado Fuel & Iron Corp., Claymont, Del. In addition, plans call for the construction of coking facilities large enough to meet the requirements of the blast furnace, and docking facilities.

The project will involve an estimated expenditure of $41,500,000, with 85 per cent of the outlay approved by the Defense Production Administration to be written off in five years in depreciation for federal tax purposes. If all goes as planned, work should begin in about 60 days, with completion likely within 15 months from date of start.

Chicago

AVAILABILITY of production facilities for precision castings made by the shell molding process was announced recently by Powdered Metal Products Corp. of America, Franklin Park, Ill. For several years this company has been an important manufacturer of precison parts by powder metallurgy techniques and it entered the new field because die making for the two processes are closely akin. Furthermore, buyers of powder metal parts frequently have need for precision cast parts as well.

Just come to light is the fact that the company has developed and now is showing for the first time an interesting machine for making shell molds on either a manual or automatic basis. This machine, push-button controlled, can make complete shell molds (cope and drag) up to 12 x 18 in. in size at rate of about 20 per hour. Molds are clamped in holders as many as 30 at a time, and carried by two men to spout of furnace for pouring.

Company has its own facilities for melting steel, stainless steel and other alloys and nonferrous metals. Gray iron is poured by Major Foundry Co. Inc., whose plant is directly across the street.

Detroit

ERA OF THE ALUMINUM engine for other than aviation uses has begun. Packard Motor Car Co. kicked it off with two marine diesels whose first use will be in Navy minesweepers. These engines have been designed to be built for commercial use after military needs have been met.

Production presently is centered in two models—a six cylinder in-line, rated at 300 bhp at 2000 rpm, and a 60-deg. V-12, rated at 600 bhp. Eventually two other engines—an in-line eight and a V-16 using the same basic cylinder design—will be added.

An outstanding characteristic of the new engines is their light weight, the result of using aluminum castings for most of the bulky parts. Cylinder bl k and integral crankcase, oil p valve covers, timing gear covers, supercharger, intake and exhaust manifolds, accessory housings and cover plates, pistons and other parts cast of aluminum in sand cast or permanent molds. In comparison with other marine and industrial diesels now in production, Packard's weigh substantially less in total weight, and in pounds per brake horsepower weigh from about half to a seventh of other makes. The six weighs 2200 lb, the V-12 3250 lb. The light-weight engine field will probably soon be crowded, at least one of the major diesel engine makers—Detroit Diesel—being reported to have an all-aluminum model well along in development. Potential uses, other than marine and industrial, may be in trucks and busses.

Another noteworthy feature of the

(*Concluded on page* 140)

Official U. S. Navy Photograph

Our Military Strength DEPENDS ON METALS

Leading producers of electric steel, aluminum and foundry metals for America's military needs find that **GLC Graphite Electrodes** perform economically and dependably.

GLC Graphite Electrodes are built for quality every step of the way from raw materials to finished products. Metal producers can depend on them for uniformity, strength, low oxidation.

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(*Concluded from page 138*)

engines is complete interchangeability of major parts. The basic cylinder is of 142-cu. in. displacement with a bore of 5⅜ in. and stroke of 6¼ in. To the cylinder liner—a steel casting—is welded a steel cylinder head cast by the lost wax process, the entire unit being readily removable from the block for replacement. In addition to this assembly, which is standard for all engines, are interchangeable pistons, wrist pins and rings, intake and exhaust valves, valve springs and guides, and bearings.

The water-cooled engines have other design innovations. Among the most intriguing is the cylinder head, labeled by some engineers as the largest and most complex steel casting to be made by the investment process. Produced by Haynes-Stellite Division of Union Carbide & Carbon, this can properly be called the heart of the engine. The circular part contains in its interior a spherical precombustion chamber as well as the intake and exhaust ports. Outlet of the chamber is through a removable multiple orifice burner centered over the piston.

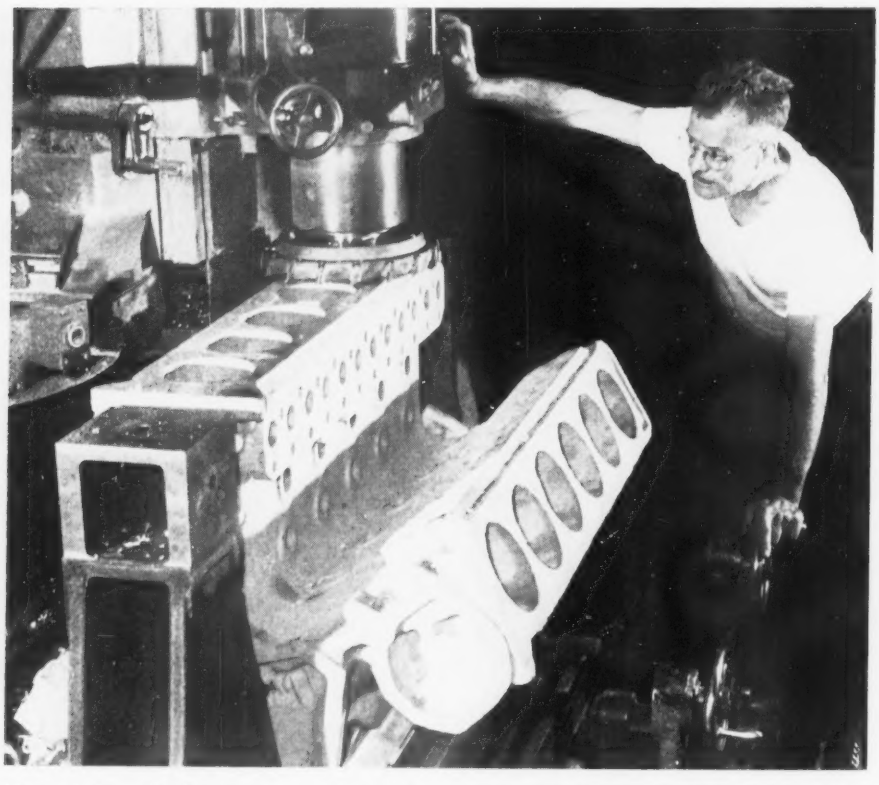
The exhaust manifold consists of a cast aluminum exterior shell and a stainless steel interior tube, with dead air space between as an insulator. Maintaining the heat of the exhaust gases is important because this drives the turbocharger turbine.

Packard is devoting an entire building adjacent to its main plant in Detroit to the engine, and is doing the bulk of the machining work.

In what combinations these engines are used in Naval vessels is restricted information, but it is understood that about six or seven are required per ship, several supplying power for other purposes than motive.

Iron foundrymen who have been dependent on out-of-state pig iron are excited with the prospect of a merchant iron and coke plant in Detroit's front yard. Michigan Iron & Coke Co. of Detroit, after receiving notification from DPA of fast tax write-off privileges, has announced plans to begin construction immediately of a $25 million plant, just south of St. Clair, Mich., on the St. Clair river. The facilities, as planned, will have an 850-1000-ton blast furnace, capable of turning out 300,000-plus tons of iron a year. A coke plant of about 55 ovens, making 350,000 tons yearly. Officers, tentatively named, are Frank J. McLaughlin, president; O. P. Ashurst, vice president; and Frank J. Donovan, secretary. On the board, beside these men, are Carl W. Johnson, H. Kirk White, Don R. Mitchell and C. B. Bentley.

On the production scene, auto and truck output has started the long road back to pre-steel strike levels, but foundry activity remains depressed. Coke remained plentiful throughout the strike. Cast scrap has bounded back about to ceiling, and with the exception of unstripped motor blocks is in tight supply.



Top of the all-aluminum cast block for the new Packard marine diesel engine is milled as the first machining operation. In production now are the V-12, 600-hp unit shown and an in-line six. Later an in-line eight and V-16 will be produced. All major components are interchangeable

DISTRICT gray iron foundries are anticipating seasonal improvement, following a mild gain recently. They believe that the passing of Labor Day and approach of fall should mark the real turn. Also more normal conditions generally among most metalworking shops, now that the steel strike is over, should prove beneficial.

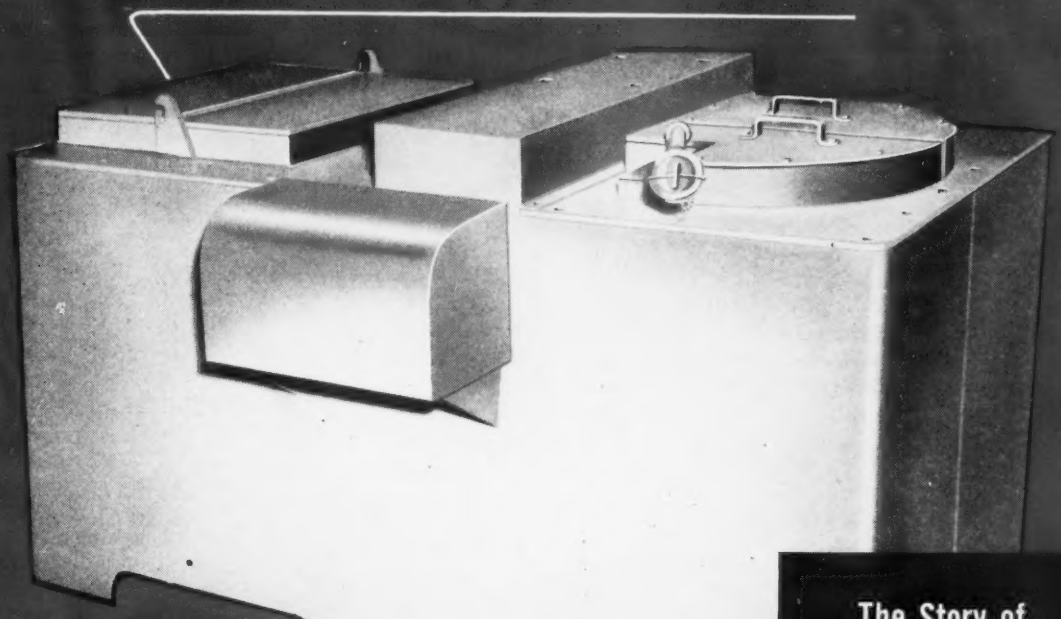
Steel foundries have been active throughout the entire summer, and still have heavy backlogs on order. Business with malleable and nonferrous shops is only fair. Those doing well among the latter are the exception and ascribe their favorable positions to defense work.

THE STEEL strike cost six western steel mills 656,440 tons of ingots, but had little effect on foundries. Most ferrous foundries suspended casting shipments to struck plants during the strike reducing total casting output by about 10 per cent. With resumption of steelmaking, inquiries from steelmakers and fabricators increased.

Demand for castings is not vigorous enough to cause foundrymen much optimism. Sales to automotive, truck and trailer manufacturers are slow. The logging business in the Pacific Northwest is tied up by strikes. Demand from the building trades is weak. About the only signs of strength in the casting market are to be found in the aircraft industry. Magnesium, and aluminum foundries supplying aircraft manufacturers, are at 100 per cent capacity and most are booked for long periods. Generally, nonferrous foundries are running at 60 per cent of capacity and steel shops about 75 per cent. Iron foundries are very quiet.

As the steel strike darkened blast furnaces, pig iron grew very short. Foundry buying increased and No. 1 cupola cast tended to become scarce. Previously soft, scrap prices firmed, until at strike's end cast was selling for $42-$44. With resumption of steelmaking, both Kaiser Steel Corp. and U. S. Steel Co. began making pig available to the trade at $38-$40 per ton. Trade observers now consider likely a weaker tone to the demand for cast material in this district.

JUST PUBLISHED!



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Get your copy of Bulletin 560. It tells how Lindberg-Fisher two-chamber construction combines the functions of melting and holding furnaces.

- . . . permits charging cold metal without disturbing temperature conditions in ladling or pouring chamber.
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By EDWIN BREMER

Foundry DEVELOPMENTS

PRIMARY factual data and basic principles necessary for designing shielded x-ray installations are available in a new book *X-ray Protection Design* by H. O. Wyckoff and L. S. Taylor (National Bureau of Standards Handbook 50) which may be obtained from the Government Printing Office, Washington 25, for 15 cents. Based on recommendations of the National Committee on Radiation Protection, the book gives a variety of examples to illustrate the application of fundamental principles and recommendations, and carries out detailed calculations showing how to determine the optimum conditions providing sufficient protection for safe operation with the most economical form of radiation shielding. Protection requirements both for persons working with equipment and for those in adjoining areas are considered.

* * *

SUCCESSFUL use of cemented carbide inserts for trimming flash or excess metal from steel castings is reported by Oliver Corp., Shelbyville, Ill. Carbide inserts are on shear blades used on a progressive die in a crank press in which cast steel mower blade guards are pierced, riveted and trimmed, as indicated by the lines in the accompanying

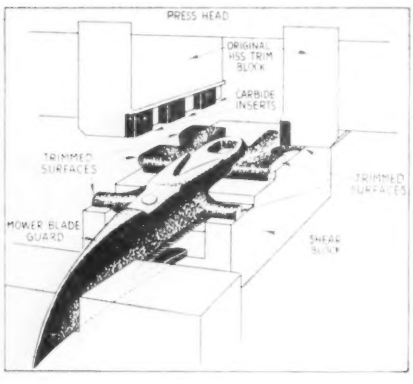


illustration. Original trim blocks had to be changed at the end of the day after trimming 12,000 pieces, but installation of the carbide inserts at the six indicated points, ranging in length from ¼ to ⅝-in., increased the life to over 100,000 pieces between grinds. Cemented carbide inserts were made by Carboloy Department, General Electric Co., Detroit.

* * *

BRITISH foundry investigating shell molding procedures is reported to be pouring off the molds in a horizontal position rather than in the vertical position as commonly practiced. Molds are clamped together with suitably bent nails, and laid on a pair of rails. No backing material is employed.

* * *

ACCORDING to an investigation by Takaji Kusakawa, Casting Research Laboratory, Waseda University, Tokyo, spheroidal graphite can be produced in cast iron by use of calcium silicide. Using a low-sulphur Swedish charcoal pig as the base, 7 to 10 per cent calcum silicide was required which resulted in an iron containing 4.5 to 6 per cent silicon. In all cases quasi-flake graphite was present as well as spheroidal graphite. High melting temperature also is a requisite.

* * *

STEEL foundry encountering machining difficulties due to hard spots in low-carbon steel castings found, after microscopic investigation, that the trouble was due to a small layer of higher-carbon content material. Since the areas involved were next to the core, the latter was suspected. Core mixture was changed to eliminate some of the organic binders present, and the undesirable condition was corrected.

* * *

EVAPORATION techniques for adhesion of solders and electroplatings to oxide-coated metals and glass have shown great progress at the Engineer Research and Development Laboratories, Fort Belvoir, Va. Metals such as aluminum, chromium and titanium become coated with an oxide film even at room temperature in a vacuum, and it is desirable to secure adhesion to them by a process which includes their oxides. Evaporated films of most metals which form hard adherent oxide coatings can be caused to adhere tenaciously to their own and other oxides including glass. Gold silver and copper show poor adhesion to oxides. However, those can be made to adhere to a metal of the previously mentioned group by high vacuum evaporation techniques. For example to coat titanium with copper, titanium is first evaporated on the oxide-coated titanium. At the first evidence of titanium deposition the evaporation of copper is begun. At the first copper deposit, the titanium source is turned off, and the copper evaporation continued until no titanium shows through the surface. Resulting surface can be soldered or electroplated.

* * *

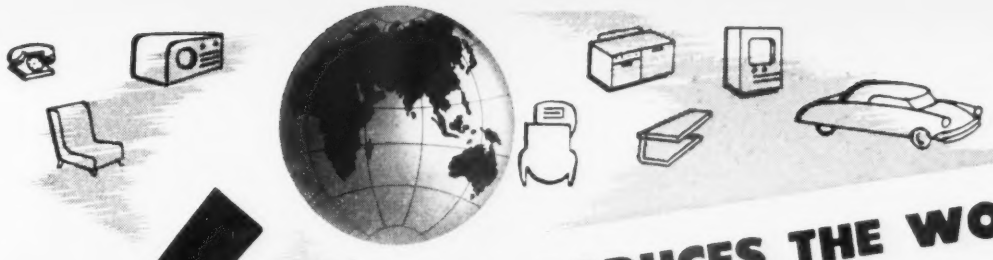
RECENTLY developed adhesive for fastening shell molds together is claimed to perform that function in 15 to 90 seconds depending upon the temperature of the shells. It is a water soluble resin used in combination with an accelerator and corn flour or cereal with a usable life of 3 to 4 hr. When mixed the adhesive has a creamy consistency, and is placed on a shell having a temperature of 70 to 150°F. Closing shell preferably should be at a temperature below 210°F. Pressure on opposing shells is required during the curing to insure best results.

* * *

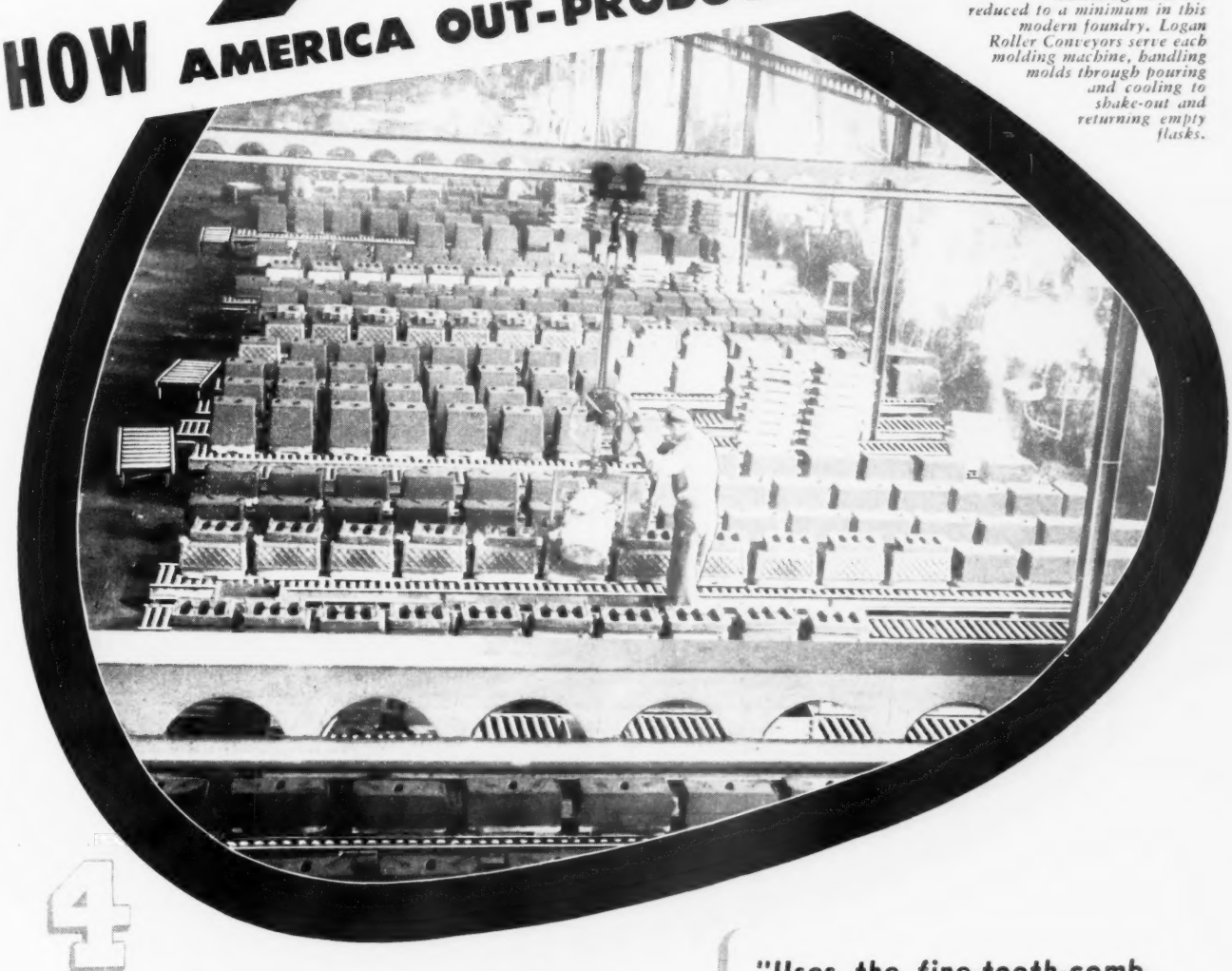
RECENT issue of *Grits and Grinds* published by Norton Co., Worcester, Mass., describes experimental work leading to development of a swing grinder mechanism which permits application of much greater pressures on the work than ordinarily applied by the operator. It points out that the latter may apply 200 lb while with the mechanism it can reach 420 lb. With 200 lb pressure about 40 lb of metal is removed per hour in grinding stainless steel, with a total cost of 25.9 cents per lb. At 420 lb pressure 135 lb of metal is removed per hour at a cost of 16.4 cents per lb.

* * *

DISCUSSING gas removal from molten aluminum alloys, A. W. Brace, in a paper presented at the annual meeting of the Institute of British Foundrymen, pointed out that it is possible to remove the gases to such a point that difficulty is encountered with gross shrinkage porosity due to difficulty in feeding. Apparently a small residual gas content aids feeding the casting.



HOW AMERICA OUT-PRODUCES THE WORLD



Handling costs are reduced to a minimum in this modern foundry. Logan Roller Conveyors serve each molding machine, handling molds through pouring and cooling to shake-out and returning empty flasks.

4

American Industry

"Uses the fine-tooth-comb method of searching out new ways to cut costs"

Never satisfied with perfecting one operation, the American foundryman applies careful scrutiny to *every* operation in his plant. Equipment and procedures are checked right down the line, for cost-cutting possibilities. An important factor is handling equipment. Foundrymen don't say "Yes, we use conveyors." Instead they ask "Are we using conveyors at every possible operation?" It is this fine-tooth-comb method of approach which distinguishes American industry. There is a Logan Conveyor engineer near you. Write for him to call, or for literature. And remember you always get that certain plus-value when you specify "Logan" Conveyors.

Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

MAN-TO-MAN

on the Molder's Bench

"Thought Starters"

By RALPH L. LEE

WE all have our moments, I guess, when we either are in the pink or the blues. Right now blue is the hue for me. As it usually turns out, no one can be blamed but myself.

I just got through shaking out a casting, one of the largest the Lee Hobby Foundry is fixed to turn out. I had to scrape up the last smidgeon of sand in the shop and only filled the mold by a squeak. The crucible was filled to the brim but provided barely enough metal.

To put it bluntly the casting is no good. The cause is a nasty shift and considerable patching resulting from a cockeyed lift; and all of this in spite of a bang up pattern. (I made the pattern.) I started out to salvage the casting with a stunt that Jake Dee from down in Houston, Tex., told me about. You bury the casting in the sand with the bad spot exposed and pour in new hot metal to make the patch. This is a darned good scheme in deserving emergencies. But in my case the conscience wasn't clear; I wasn't entitled to use the patching technique.

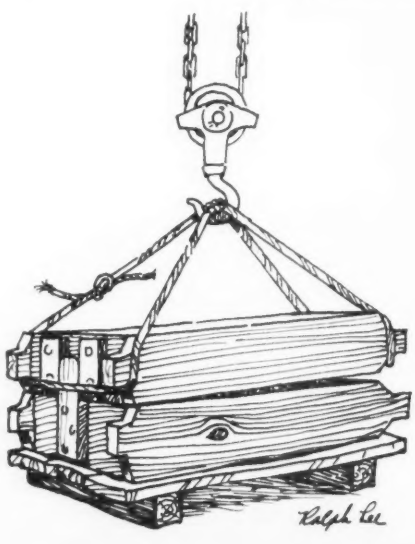
All the trouble started by being too much in a hurry to get a casting, and by compromising with the devil every step of the way. The only bottom boards big enough, by a narrow margin, were anything but flat and I knew this after setting the flask down on first one and then the other of them.

The flask itself was certainly a work of art. I had made it out of odds and ends when you could not get lumber for love nor money. The pins and guides were way too loose and not nearly long enough for the high lift I knew I was going to have. But for some reason or other, with all of these strikes against me and knowing better, I sweat quarts with a vague hope that through luck I would get a casting that would do.

Now I am not making any excuses for myself. In fact, I'm hitting the saw-dust trail and confessing my sins. I will admit, though, that I probably would not be quite so repentant if the casting had squeaked over the scrap line. (By the way, the casting was not so bad but what it could have been used in a pinch—with bowed head.)

I do not think sinners should take much comfort in the knowledge that they have lots of company. On the other hand, I must confess that the sharpness of my sin was somewhat dulled when I remembered some of the bottom boards, flasks, pins, lifts and patching (both sand and metal) that I have seen on my many foundry visits.

Of course, I am not in a position to view with alarm or to point the old finger with scorn, and I have no intention of doing so. On the contrary I marvel at the tremendous tonnage of usable castings that do come through after running the gauntlet of makeshift compromises with the ABC's of molding. All of which again proves to me that of the many processes used for shaping metal, the sand casting process will take more punishment and still come through than any of them.



With a quick switch from the ridiculous to the sublime, I recall a little casting I made some time back of a nicely finished mahogany pattern. This casting not only showed the grain of the wood in sharpest detail, but the pencil lines of my layout. (And I didn't bear down on the pencil either.)

Shortly after this I cast some rather intricate working parts of a pressure valve mechanism for my new molding machine. Without stretching it a bit, they went together as planned and worked without any finish on the working points and surfaces.

Along ornamental lines I have cast a surprisingly accurate duplicate of an embossed paper placemat as well as some wax engravings with fine filigree do-dads. Out on the west coast I saw a fellow cast a deep rectangular instrument cover in green sand. I swear the walls were not $\frac{5}{64}$-in. over an eighth of an inch. This was cast of aluminum. The operator making this casting had the most unfoundry like rigging of army surplus hydraulic apparatus I have ever seen assembled to lift the flask and draw the pattern. The sides of those castings were almost straight down.

I know that these stories I am telling will not surprise anyone who gets about a bit. But to me they prove beyond all question of doubt that sand casting, by its very nature, *is a precise method of duplication* and that if given a chance it can provide precision including finish suitable for the vast majority of metal products. When I say "if given a chance" I mean bottom boards, flasks, flask pins, flask fittings, pattern plates and above all lifts.

Suppose a blanking or forming punch was guided into its die with an arrangement similar to some of our flask pins and fittings.

Suppose that these same punches and dies were leveled off together with the same accuracy our poor beat up flasks and boards provide.

Think of even the most accurately made pattern plates being forced into conformity with these same uneven

(*Concluded on page* 146)

Look at it NOW!

A TYPICAL COMPARISON

SCRAP PILE
before using
Famous CORNELL
Cupola Flux

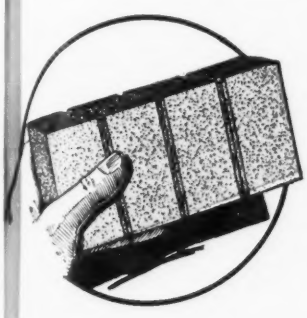
Scrap pile is practically nil where
Famous CORNELL CUPOLA FLUX *is used!*

THE CONDITION OF YOUR MOLTEN IRON CONTROLS AMOUNT OF CASTING SCRAP

Hundreds of leading foundries—our regular customers—will tell you the time tested and proven way to reduce and hold casting scrap loss to the minimum is to use Famous Cornell Cupola Flux—the metal cleanser with a background of more than thirty four years' success in casting improvement.

Famous Cornell Cupola Flux not only purges molten iron of impurities but makes it hotter and more fluid, reduces sulphur and keeps slag fluid.

The superior condition of iron is reflected in cleaner, sounder, tougher castings—and easier machinability.



Pre-Measured SCORED BRICK FORM *(Approx. 4 lb. brick)*

Famous Cornell Cupola Flux keeps cupolas cleaner. There is practically no bridging over, and a glazed or vitrified surface formed on brick or stone lining reduces erosion. Down time and maintenance is reduced amazingly.

And there is a big advantage in the easy-to-use pre-measured Scored Brick Form. Practically no labor is required to lift Famous Cornell Cupola Flux from container and toss it into cupola. Where charges of iron are less than one ton, you simply use one to three briquettes (quarter sections) as per instructions.

WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

(*Concluded from page 144*)

and widely varying flasks and boards.

Again, I am not viewing with alarm—I am just bragging about how precise the sand molding process manages to be in spite of variations and abuses few other metal working methods could possibly tolerate.

I count myself to be way up in front with a bald headed row of applauders for the shell molding process when I handle a casting that looks like a die-casting. But when I think of my embossed paper casting, the grain of the pattern wood, the valve parts and the instrument case, I ask myself "Just what is the major difference between the shell molding scheme and ordinary sand molding?"

To my amateur mind the answer which always comes up is "*lift.*" The hardened sand itself serves as guide pins—so that irregular boards, flasks and pins, to say nothing of shaky molders, cannot do their dirty work.

With due credit to the splendid progress made in the fields of die casting, permanent molds, investments and the shell molding process, I cannot help but think a great opportunity for precise casting still lies ahead of us in sand. Our flask people, molding machine folks, patternmakers and others are all moving ahead in this direction. But it seems to me that a vision of punch presses with their machined and scraped ways; presses for die casting, for rubber and other plastics, for powdered metallurgy, and for drop forgings, will light the way for a new day of precision and finish we never dreamed possible in the field of our grand old standby *SAND.*

WHEW! I certainly was all wound up and probably off the deep end again. Well, anyway, the Lee Hobby Foundry is going to mend some of its sloppy ways and turn out a precise casting or two.

Plant Protection Booklet Is Available

A booklet setting forth measures which should be taken to insure protection of industrial facilities, particularly those vital to the national defense, has been prepared by the Office of Industrial Security, Munitions Board, Department of Defense. Entitled "Standards for Plant Protection," this booklet supplements but does not supplant "Principles of Plant Protection," a Department of Defense publication issued in 1950.

The material covers entry procedures, anti-espionage and sabotage measures, fire and accident prevention and other areas of the general subject of plant protection. It is available for 20 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25.

Meetings of Interest to Foundrymen

Sept. 8-10—American Standards Association, national standardization conference, Museum of Science & Industry, Chicago

Sept. 8-12 — Instrument Society of America, national conference and exhibit, Cleveland

Sept. 18-19 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Sept. 22-23—Steel Founders' Society, fall meeting, the Homestead, Hot Springs, Va.

Sept. 26—Malleable Founders' Society, industry meeting, Hotel Cleveland, Cleveland

Sept. 26-27—Ohio Regional Foundry Conference, Ohio Chapters, AFS, and Ohio State Student Chapter, Ohio State University, Columbus, O.

Oct. 10—Malleable Founders' Society, personnel conference, Hotel Cleveland, Cleveland

Oct. 16-17—Gray Iron Founders' Society, annual meeting, Hotel Cleveland, Cleveland

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18 — Michigan Regional Conference, Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters, AFS, University of Michigan, Ann Arbor, Mich.

Oct. 18-24 — American Society for Metals, National Metal Congress and Exposition, Philadelphia

Oct. 20-24—National Safety Council, national safety congress and exposition, Chicago.

Oct. 24-25—New England Foundry Conference, MIT, Cambridge, Mass.

Oct. 24-25—Northwest Regional Foundry Conference, Oregon, Washington, and British Columbia Chapters, AFS, Multnomah Hotel, Portland, Oreg.

Oct. 30-31—Metals Casting Conference, sponsored by Purdue University, Michiana and Central Indiana AFS chapters, Purdue University, West Lafayette, Ind.

Oct. 31—Nov. 1—All Canadian Foundry Conference, sponsored by Eastern Canada and Ontario Chapters, AFS, Mount Royal Hotel, Montreal

Nov. 13-14—Southwestern Regional Foundry Conference, Texas and Tri State Chapters, AFS, Baker Hotel, Dallas, Tex.

Nov. 19 — American Standards Association, annual meeting, Waldorf-Astoria Hotel, New York

Nov. 20-21 — American Society for Quality Control, Midwest conference, Claypool Hotel, Indianapolis

Dec. 3-5—Society for Experimental Stress Analysis, annual meeting and exhibition, Hotel McAlpin, New York

Dec. 4-6—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference William Penn Hotel, Pittsburgh

1953

Jan. 19-22—Plant Maintenance Show and Conference, Public Auditorium, Cleveland

Jan. 23—Malleable Founders' Society, general society meeting, Hotel Cleveland, Cleveland

Feb. 6-7—California Regional Foundry Conference, Berkeley, Calif.

Feb. 12-13—Wisconsin Regional Foundry Conference, sponsored by Wisconsin Chapter, AFS, and University of Wisconsin, Schroeder Hotel, Milwaukee

Feb. 19-20—Southeastern Regional Foundry Conference, sponsored by Birmingham, Tennessee, and University of Alabama Student Chapters, AFS, Tutweiler Hotel, Birmingham

Mar. 2-6 — American Society for Testing Materials, spring meeting, Statler Hotel, Detroit

Mar. 12-13—Foundry Educational Foundation, annual TAC-UAC conference, Cleveland

Mar. 23-27—American Society for Metals, western metal congress and exposition, Pan-Pacific Auditorium, Los Angeles

Apr. 9-10—Malleable Founders' Society, fourth annual market development conference, Cornell University, Ithaca, N. Y.

May 4-8—American Foundrymen's Society, annual convention, Chicago

June 29—July 3—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City

Oct. 8-9—Gray Iron Founders Society, annual meeting New Hotel Jefferson, St. Louis

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IBF CONVENTION TECHNICAL PAPERS

Review Metallurgical and Production Problems

By VINCENT DELPORT
European Manager
FOUNDRY

SEVENTEEN papers and a film were presented at the 49th annual conference of the Institute of British Foundrymen at Buxton from June 10 to June 13. The first paper, "Role of the Research Foundry Unit," was the official exchange paper contributed by the American Foundrymen's Society and written by G. A. Lillieqvist, research director, American Steel Foundries, East Chicago, Ind. (This paper will be presented in an early issue of FOUNDRY.)

Before presenting his paper, Mr. Lillieqvist read a letter signed by President Walter L. Seelbach and Secretary-Treasurer William M. Maloney of the American Foundrymen's Society extending the most cordial greetings and the best wishes of the society to the Institute of British Foundrymen for a successful conference.

A lively discussion followed the presentation of the paper. Replying to J. Jackson, director of research, British Steel Corp., Sheffield, Mr. Lillieqvist said that although he was not familiar with converter practice, he believed that hydrogen and nitrogen would have an influence on fluidity. When he and his colleagues had added hydrogen to heats in an induction furnace, the fluidity had decreased. Asked about hot tears, he said that the acid furnace showed a much higher hot tear characteristic than the basic. Referring to Mr. Jackson's query about acid pickling, he said that he thought it was a very good test and that in time foundrymen would recognize it.

Hard To Machine

With regard to a question about welding, Mr. Lillieqvist said it is a well known fact that welded deposits are difficult to machine. There is a heat effect that cannot be avoided, and it is preferable to have better quality control and better supervision of the casting. However, his firm could weld 0.27 per cent carbon and 0.20 per cent manganese and had even obtained results with 0.45 per cent carbon, but with more difficulty.

Replying to a member who inquired about sulphur, the author said that there is no reduction in either basic or acid induction furnaces. When his firm removed the sulphur in the basic open hearth from approximately .018 or .019 per cent, the foundry test showed a sulphur content of .013 or .014 per cent, a drop of .005 per cent in the sulphur. With the acid electric the same drop occurred. Answering a question about rare earths, he said that these depress the solidification point of steel about 35 to 40° F.

Of the remaining 16 papers, four dealt with gray iron, four with steel, three with nonferrous and light alloys and five with miscellaneous subjects.

In the gray iron section, Dr. H. T. Angus discussed "Strength, Structure and Composition of Unalloyed Gray Iron." He proposed to present an orderly summary of existing knowledge on the subject in such a manner that foundrymen can make use of it in their day-to-day work. The basis of the discussion is the carbon equivalent value:

$$C.E. = T.C. + \frac{Si + P}{3}$$

This formula is an expression of the effect of silicon and phosphorus in lowering the carbon eutectic figure by approximately 0.3 per cent for each 1 per cent of silicon and phosphorus present. On this basis the author discussed tensile strength, transverse strength, reduction of strength with section, hardness and shock resistance. He discussed the relationship between composition and structure and went on to consider cooling rate and to give simple examples of the way in which the curves indicated in the paper can be used.

In the ensuing discussion, Mr. Reynolds mentioned that the paper did not refer to runners. Dr. Angus said that they were one of the things in which the foundryman's experience had to play a part, that they could not be learned about from diagrams. He agreed with the questioner that one should use as few mixtures as possible. Dr. Riley referred to a statement in the paper to the effect that the resistance to iron to shock bore no relation to the carbon equivalent value. This, he said, might be an approximation, but he felt that if the silicon was raised, the iron was probably more prone to shock than it would be with a lower silicon.

Dr. Angus replied that he had worded the statement in that manner because to him carbon equivalent value included phosphorus. With 0.7 per cent phosphorus, one could get 17-ton iron with low shock resistance. When phosphorus was used in a mixture, shock resistance would increase, generally speaking, because the carbon equivalent was lower. He had worded the statement as he had because of the interference effect of phosphorus, which would completely upset any shock resistance figures.

Molds Cracked

Replying to a further question, he said that he had referred only to mechanical shock, that resistance to thermal shock rose with increased graphite content. Mr. Reynolds mentioned that when ingot molds for casting copper were made with a cold gray iron, the molds cracked when copper was cast in them. His colleagues had annealed molds of the same composition, but found that the only answer was a fairly high silicon hematite type and fairly high carbon. Mr. Reynolds later mentioned that in his experience he had found that when using fairly common irons, he obtained better and more consistent results by using two pig irons, rather than just one. Two irons used in combination invariably produced better results and a higher tensile strength than either one used alone.

The next paper was "Production of Ingot Molds by Sandslinger in a Mechanized Foundry" by J. Raymond Jones, who described the new ingot mold foundry at Landore works of Richard Thomas & Baldwins Ltd. The molds, which weigh from 10 to 22 tons, are required by the new works of the Steel Co. of Wales and the works of Richard Thomas. The author described the layout of the foundry, the drying stoves and the cupolas, of which there are three, with an average melting rate of 12 to 14 tons per hour and a daily output of 250 tons.

The sand plant has a continuous mill. There is a special knockout grid, the castings are cleaned by wheelabrator. Well equipped laboratories for sand analysis and pig iron control are maintained. The main factors which controlled the design of this foundry were the necessity to provide an output of 1000 to 1200

(*Continued on page* 151)

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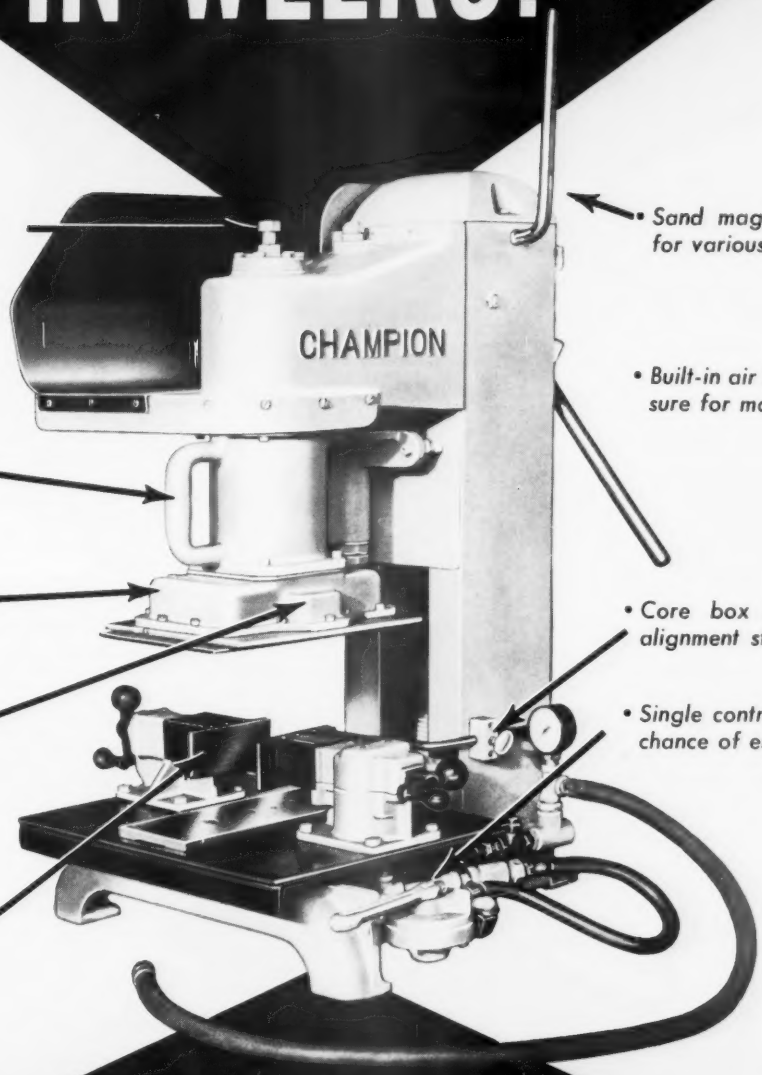

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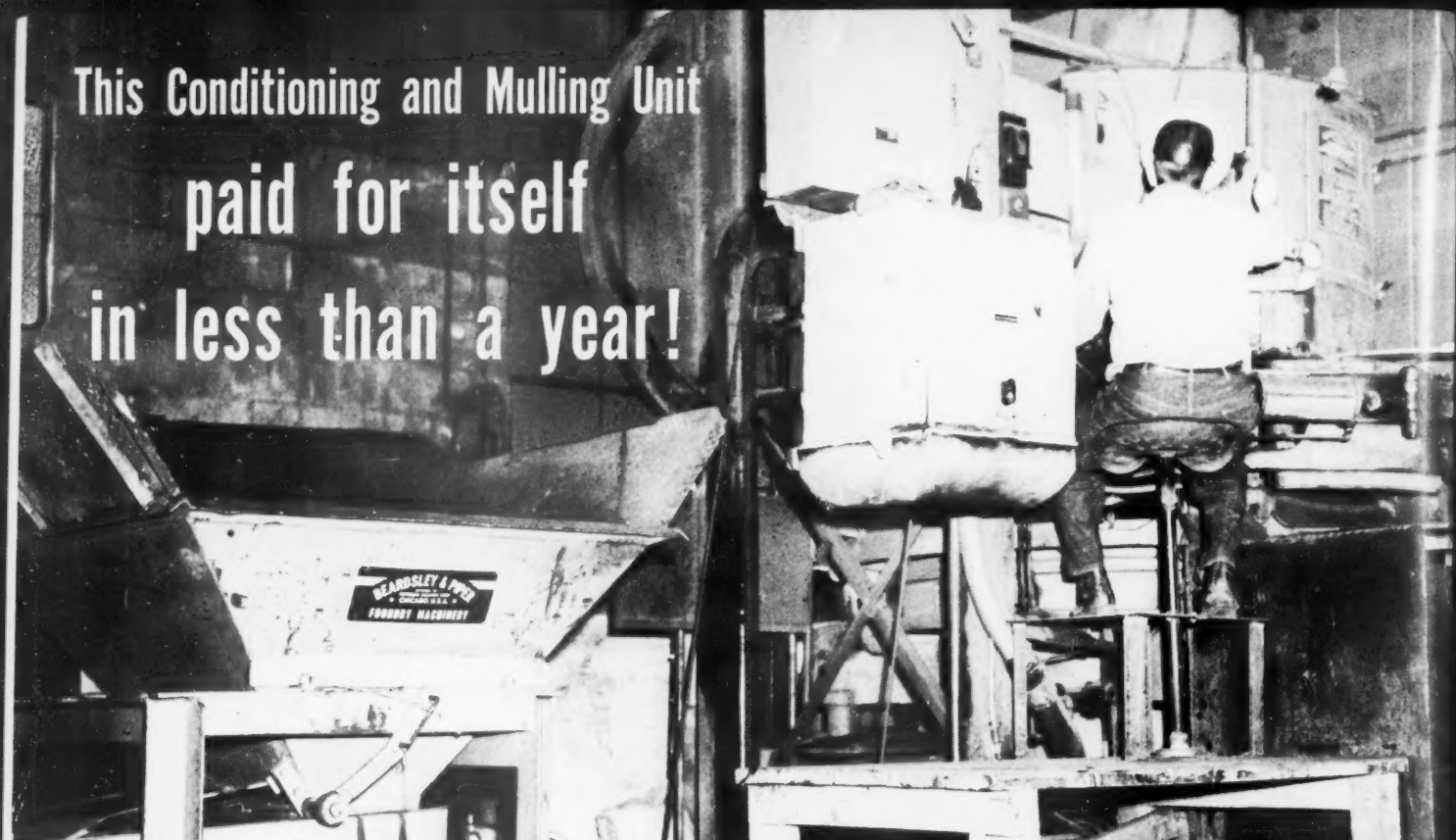

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(*Continued from page* 148)

tons of ingot molds weekly, the wish to reduce hard physical work to a minimum, and the desire to offer good working conditions.

Discussion chiefly concerned points of layout, organization of an ingot mold foundry, and details of practice. The author gave more information about the new foundry in his replies. The standard analysis, except for very small molds, is 3.4 to 3.6 per cent carbon, 0.18 per cent combined carbon, 1/6th to ⅛th silicon (0.141 silicon for small molds), 0.06 per cent sulphur, 0.5 per cent phosphorus and 0.8 per cent manganese. Mr. Jones said the foundry has no trouble with application of the sandslinger to deep molds; in fact, density is much more even than with hand-rammed molds. Questioned about the composition of the charge, he said that the foundry uses up to 30 per cent ingot mold scrap when it is available, but does not use machine scrap.

Asked why the foundry wrapped core bars with straw, Mr. Jones explained that experience showed that

(*Continued on page* 154)

MINIATURE CUPOLA AIDS IN MELTING STUDY

By JOHN F. DRENNING
Kerchner, Marshall & Co.
Birmingham

VISITORS at the International Foundry Conference and Show in Atlantic City saw what is believed to be the world's smallest cupola in operation. It was displayed through the courtesy of McWane Cast Iron Pipe Co., Birmingham, at the Carborundum Co. booth, and operated by McWane personnel—Dr. Fred C. Barbour, Raymond Carter Jr. and Woodrow W. Sanderson.

This unit was first publicized in the Autumn 1948 issue of "Sloss Pig Iron Rough Notes," quarterly technical publication of the Sloss Sheffield Steel & Iron Co., Birmingham, and has attracted wide interest since then.

Dr. Fred C. Barbour, chief metallurgist, and William M. Spradlin, melting supervisor, McWane Cast Iron Pipe Co., designed and built the 3-in. cupola to study the effects of various elements in iron. Experimental work in the small cupola can be duplicated in the larger cupolas at the McWane plant.

Since the original cupola did not have peep holes and doors on the bottom, two new 3-in. cupolas were built at McWane for the show at Atlantic City with the same dimensions.

Dimensions for the unit are: Shell 5¾ in., height 18 in., inside diameter 3 in., six tuyeres (diam. each) 5/16-in., slag-hole 1½ in. below tuyeres, bed height 3 in., tuyeres to tap hole 3 in.

Normally, a charge consisting of the following is used: ½ pound of iron, 1 ounce of coke (½ in. down), ¼-ounce of limestone (¼-in. down). The iron is usually Talbot strips (½ x ½ x 1½ in.) or scrap pipe broken up into small pieces. However, solid pieces of iron and steel weighing as much as 2 pounds, have been melted successfully.

At Atlantic City, the charges were made up as follows: 2 pounds of iron (100 per cent scrap from sand cast pressure pipe), 4 ounces of coke (chestnut size), 1 ounce of limestone (¼ in. down), 1 five-gram Ferrocarbo briquet.

All charges were increased to the above and mixed in a paper bag to save time during the melting operation. After Saturday, two silicon carbide briquets instead of one were used and the limestone addition was eliminated.

Oxygen was not used in the cupola. Compressed air from Convention Hall was used for the blast, which was supplied through a rubber tube connected to the wind box. By using a regular gas valve, the pressure was adjusted through a column of mercury in a glass bottle. Air enters the cupola from the wind box through six 5/16-in.-diam round tuyeres, 3 in. above the tap hole.

The melting rate is approximately 60-65 pounds per hour, and the cupola is tapped intermittently. Slag is run off through a rear slag hole located 1½ in. below the tuyeres.

For burning in the bed, a new method was developed at Atlantic City because suitable gas was not available. A small blow torch with a removable fuel element was used with a great deal of success after the first few heats.

If any bridging is encountered, the wind is cut and the tuyeres are punched out in the same manner as on larger cupolas. The iron produced was very hot and fluid throughout the heats. Fractures from the pigs, poured in steel molds, showed a uniform, fine grain.

Practically every engineering school in the United States has obtained blueprints from Dr. Barbour and Mr. Spradlin, and many have had models in operation for some time. Blueprints have been sent to 17 foreign countries over a period of several years.

Blueprints of the new cupolas with bottom doors and peep holes can be obtained by writing to Dr. Fred C. Barbour or William M. Spradlin, McWane Cast Iron Pipe Co., Birmingham 2, Ala.

William M. Spradlin and Dr. Fred C. Barbour, McWane Cast Iron Pipe Co., Birmingham, operating the 3-inch-diameter cupola they designed and built

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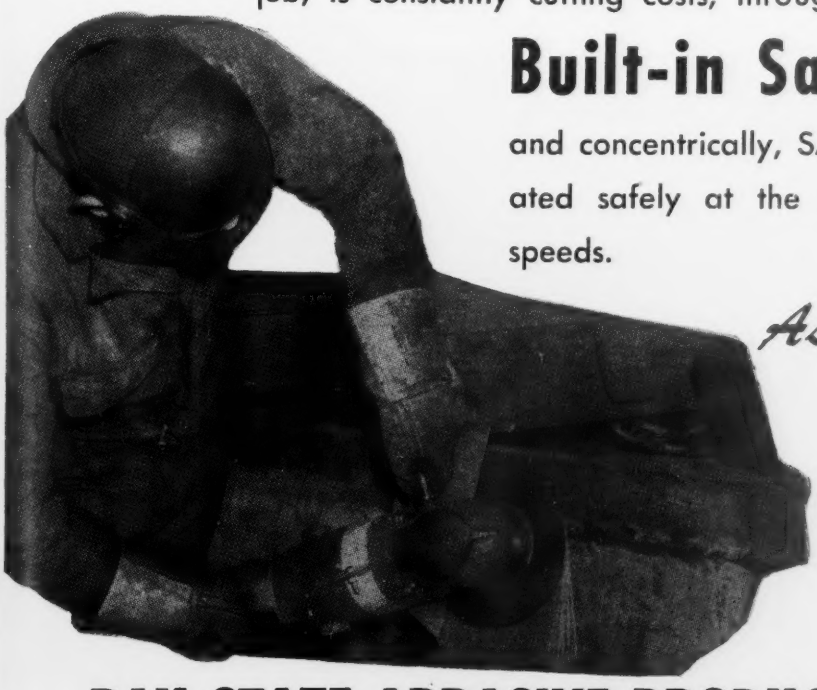

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(*Continued from page* 151)

without straw wrapping the contraction was so great that it squeezed the core up on the bar until it was so difficult to remove the core bar that the core bar sometimes broke. The same difficulty had been encountered when a lime and sand coat was used unless the sand was weakened. Then there was no bond and no trouble in stripping. The author mentioned that the downgates are 3 in. in diameter and have standard intakes off them of approximately 1 x 1½ in. The foundry pours a 10-ton mold in 3 minutes.

In a contribution on "Methods Employed in the Production of Heavy Iron Castings," J. Richardson, foundry manager, Brightside Foundry & Engineering Co. Ltd., and C. F. Lawson, foundry manager, Buckley & Taylor Ltd., exemplified the advantages to be gained by the fusion of pure science, organization and craftsmanship through experience. They pointed out that in the manufacture of steelworks plant, the range of castings required calls for almost every known method employed in foundry practice. They presented a few examples of heavy castings with particular reference to their main features and problems and analyzed production methods with the object of extracting the main principles from the mass of routine detail and formulating general principles applicable to a variety of castings.

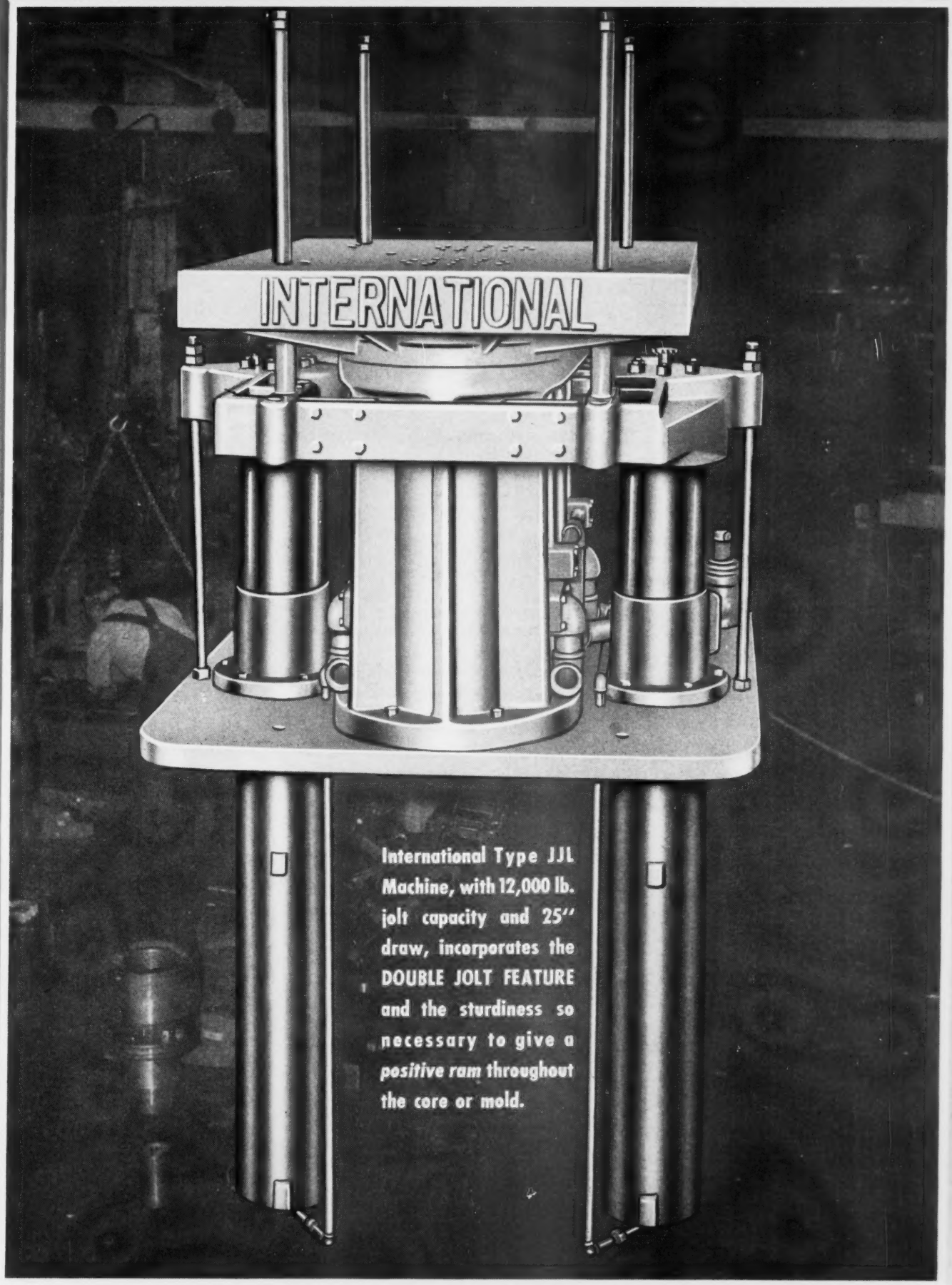
Effect of Chills

Among the points raised in the discussion was the question of chills. Mr. Lawson pointed out that two principles are involved which to a certain extent are incompatible. In one instance the object is to absorb heat, but in the other it is to affect the true structure of the metal. Chairman E. Longden said he thought the real purpose concerned the heat conductivity of the metal. In one operation chills equalized heat but did not destroy machineability, whereas in the other, as he understood it, they produced white iron.

Many points of detail were raised in connection with the specific examples of castings given in the paper. As he proposed a vote of thanks, the chairman made two points. The foundrymen had manufactured core centers of up to 21 tons and in the larger sizes had definitely insisted on the bases' being plated, but nevertheless had to take the precaution of taking the cores out and cooling them with drafts of air. Mr. Longden's other point was a recommendation

(*Continued on page* 156)

INTERNATIONAL TYPE JJL DOUBLE JOLT MACHINE



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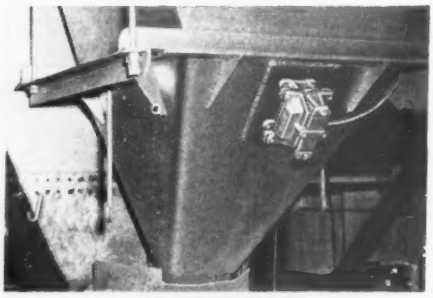

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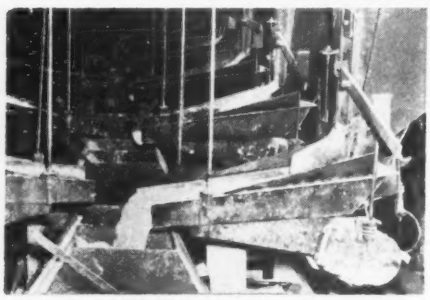

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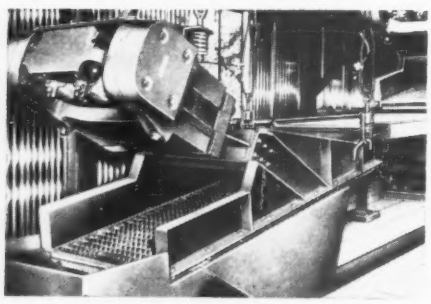

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(*Continued from page* 154)

that cast iron founders dealing with heavy castings subject to high pressure and temperature should use zircon sand because the results would make up for the higher cost.

I. C. H. Hughes, Mond Nickel Co. Ltd., Birmingham, contributed a paper on "Some Effects of Magnesium on the Formation of Graphite in a Solidifying Cast Iron." Following a brief review of the existing hypotheses to explain the mechanism of spheroidal-graphite formation and their limitations, the author described experiments to show the detailed differences between the cooling curves obtained from magnesium-free and magnesium-containing hypoeutectic cast irons.

In his conclusions, Mr. Hughes stated that the addition of magnesium to a cast iron of slightly hypoeutectic composition appears to have three main effects. It depresses the eutectic temperature, with an accompanying increase in the number of centers of eutectic crystallization; it changes the form of graphite particles to spheroidal, with a resulting essential change in growth mechanism, due to the formation of an austenite envelope around each spheroid; and it increases the tendency of the eutectic liquid to solidify as iron-carbide eutectic and decreases the tendency to form new graphite particles of any shape after the beginning of the eutectic reaction.

The author compared the respective behaviors of inoculated and noninoculated flake-graphite and spheroidal-graphite. After pointing out that much remains to be learned about the effects of composition changes, other spheroidizing elements, interfering elements, and inoculation before the full mechanism of spheroidal graphite formation is established, the author stated that the findings arrived at are broadly in agreement with the conclusions of Dunphy and Pellini, but differ in detail. For example, it has been shown that in inoculated magnesium - containing irons, the last liquid solidifies directly as austenite and graphite and that the solidification of the iron-carbide eutectic, with subsequent rapid graphitization, occurs only when inoculation is omitted.

This paper was followed by an intervention by H. Morrogh, who referred to a statement by Mr. Hughes that tin hindered the formation of nodular graphite. Mr. Morrogh said that he had found up to 0.13 of tin to be without harmful effect on spheru-

(*Continued on page* 208)

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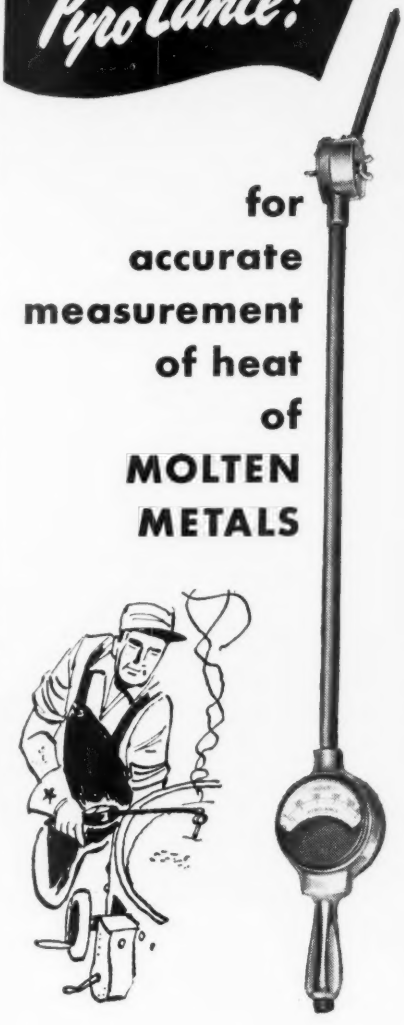

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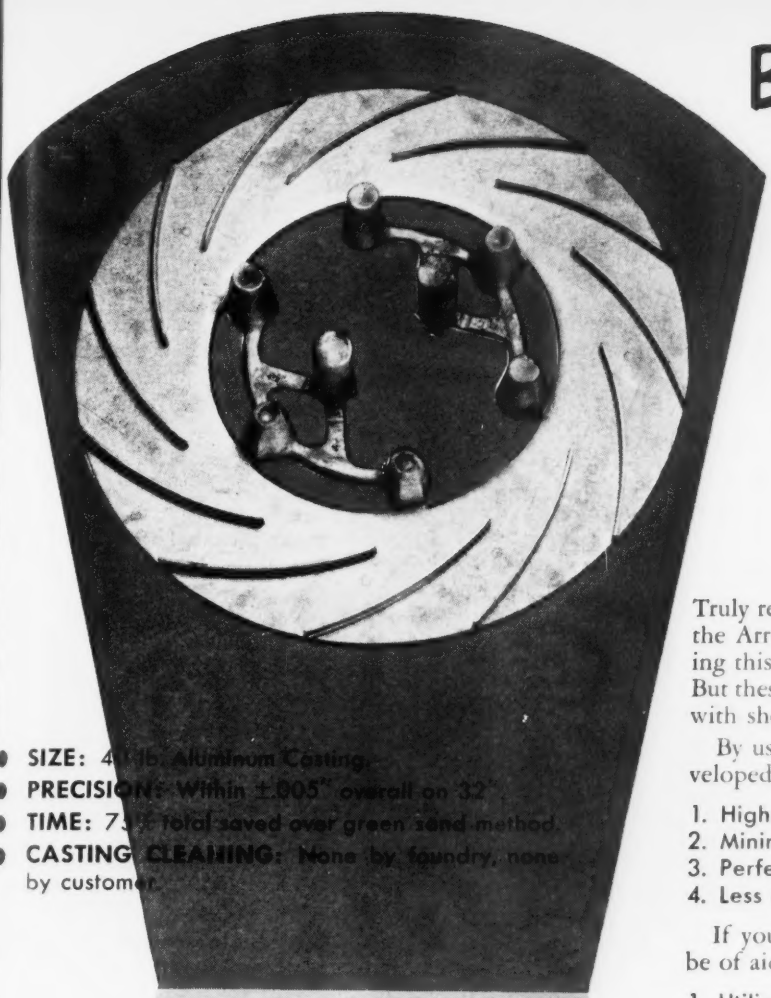

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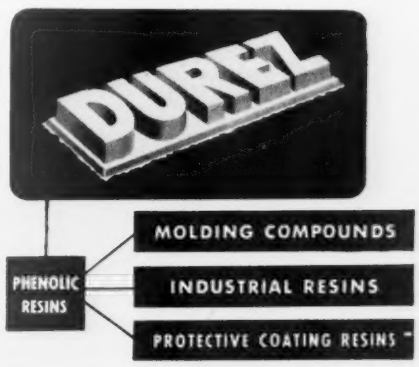

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Activities of Foundry

GROUPS

Central Ohio

EIGHTH annual picnic of Central Ohio Chapter of the AFS was held at the Columbus Riding Club June 28. Two hundred members and guests enjoyed the social activities, relaxing in the companionship of other foundrymen, and discussing mutual problems and accomplishments.

Following dinner, there was a drawing for a large number of door prizes supplied through vendors who serve the industry in the area, and few went home empty handed. A floor show completed the day's events. —*Wilfred H. White, Jackson Iron & Steel Co.*

Michiana

CHAPTER officers of Michiana Chapter of the AFS met with members of the program and entertainment committee June 27 at Plymouth Country Club to complete plans for the coming year. Program committee, headed by Leslie Pugh, Casting Service Corp., LaPorte, Ind., plans one meeting on shell molding and three ferrous and three nonferrous group meetings. First meeting will be at St. Joseph, Mich., Oct. 13, and the following meetings at Morris Park Country Club, South Bend.

Chairman Roy Payne of the entertainment committee announced the picnic will be held Sept. 13 at Plymouth Country Club. Between lunch at noon and dinner in the evening, golf, horseshoes, soft ball, etc. will be available. Bathing facilities have been arranged at Pretty Lake, four miles west of Plymouth. Entertainment is promised for the evening.—*A. J. Rumely, LaPorte Foundry Co.*

Cincinnati District

MORE than 250 members and guests were present at the annual golf party and picnic of the Cincinnati District Chapter of the AFS held June 9, at Summit Hills Country Club, Fort Mitchell, Ky. Featured was a complete program of golf, baseball, horseshoes and buffet supper with a large number of golf and door prizes for distribution to those present.

Officers elected for 1952-53 are: Burt A. Genthe, S. Obermayer Co., Cincinnati, chairman; William L. Oberhelman, Oberhelman-Ritter Foundry Co., Cincinnati, vice chairman; Harry F. Greek, Hill & Griffith Co., Cincinnati, secretary; and Harry R. Shick, Ransom & Orr Co., Cincinnati, treasurer. Directors are: Ernest Piazza, Whiting Corp.; Jesse James, Dayton Oil Co.; Phil Pearson, Williamson & Co.; and Robert H. Ritter, Oberhelman-Ritter Foundry Co.—*David J. Pusack, Cincinnati Milling Machine Co.*

Southern California

AS IS the custom, the concluding meeting of the season for the Southern California Chapter of AFS is in honor of past officers and also welcomes the newly elected officers for the coming season. This year the meeting was held June 13 at the Rodger Young Auditorium, Los Angeles, at which the accomplishments under the leadership of Henry W. Howell, Howell Foundry Co., Los Nietos, Calif., and his fellow officers were reviewed.

Those elected to serve during 1952-53 are: Harold G. Pagenkopp, Angelus Pattern Works, Huntington Park, Calif., president; Hubert Chappie, National Supply Co., Torrance, Calif., vice president; Charles R. Gregg, Gregg Iron Foundry, El Monte, Calif., secretary; and William Baud, Mechanical Foundries Division, Food Machinery & Chemical Co, Vernon, Calif., treasurer. New directors to serve three years are: Robert W. Wagner, National Brass Works; Paul Koenig, Mastercraft Pattern Co.; Anthony Tuzzolino, Overton Foundry; and Alfred A. Grant, Grant & Co.—*Alfred A. Grant, Grant & Co.*

Eastern New York

A BRIGHT and sunny day added to the pleasure of the annual outing of the Eastern New York Chapter of the AFS on June 14 at Endries Willowbrook Inn. Those who

(*Continued on page* 160)

WESTERN NEW YORK Chapter of the AFS held its annual picnic June 28 at Sturm's Grove, Bowmansville, N. Y. Committee for the affair included Lyn Roberts, chairman, Erwin Deutschlander, Roger Walsh, Alex Calwell, Marve Taublieb, Carl Johnson, Carl Harmon, Gerry Goetsch, Leonard Greenfield and Jack Heysel. Photos by courtesy of Marve Taublieb, Frederic B. Stevens Inc., Buffalo

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IN THEM THAR SAND HILLS!

Do you know that . . .

- by far the largest savings for iron and steel foundries are to be found in the rich field of sand reclamation?
- that Hydro-Blast equipment reclaims almost 90% of all sand reclaimed in the United States
- that 4000 tons of sand is reclaimed by Hydro-Blast systems daily?
- that these Hydro-Blast installations eliminate the need for 600 freight cars, or *20,000 tons of steel made available for other uses?*—a fact of major interest to government production officials!
- that the Hydro-Blast system is the only one *proved satisfactory for making refuse sand equal in quality to new sand*—assures closer control of quality *and* production cost
- that Hydro-Blast has run massive pilot-plant tests on waste sands from more than 200 foundries—sands returned for successful use in making castings
- that cash benefits realized from better quality castings, increased production, lower rejection rates and huge cuts in costs of sand and sand transportation, make for speedy amortization of Hydro-Blast equipment—in some instances only two years!
- that Hydro-Blast has been studying sand chemistry and sand reclamation continuously and objectively since 1935—and is the only concern that has.

These are strong statements. They are palatable food for straight thinking—and exceedingly nourishing.

We can prove them—and welcome opportunities to do so.

If you are casting a prospecting eye at your own sand costs, you'll find it's "good business" to talk to Hydro-Blast *first* . . . and last.

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SOUTHERN CALIFORNIA Chapter of the AFS held its last regular meeting of the season June 13 at Rodger Young Auditorium, Los Angeles. Among accomplishments of the year was collection of $200 more than its planned contribution to the AFS building fund. Above, left to right, are Henry Howell, retiring chapter chairman; Charles Gregg, treasurer, collecting money from Emil Reshke and James Oliva. Photo by Ken Sheckler, Calmo Engineering Co.

(*Continued from page* 158)

chose to compete indulged in golf chipping and horseshoe pitching contests at which Teddy Carlson, General Electric Co., officiated.

A soft ball game was staged by the huskies of Rensselaer Valve Co., Albany Castings Co. and General Electric Co., against the champions of Vermont Foundry Co., Eddy Valve Co., Adirondack Steel Co., Sandy Hill Iron & Brass Co., and Rensselaer Polytechnic Institute. A pitcher's battle ended with a score of 15-15.

Ray Willey, water dowser, conducted a demonstration of his fascinating and mysterious art of locating underground streams from a contour map of the area. Following dinner, the newly elected officers were installed. They are: Leigh Townley, Adirondack Steel Co., chairman; E. S. Lawrence, General Electric Co., vice chairman; W. C. Stevenson, Rensselaer Valve Co., secretary-treasurer.

As entertainment chairman for the second successive year, Newt Williams, George Pettinos Co., was responsible for a top flight outing.—*E. S. Lawrence, General Electric Co.*

Wisconsin

MORE than 700 members and guests attended the 17th annual golf outing of the Wisconsin Chapter of AFS held at Maplecrest Country Club, Kenosha, Wis., July 18. Because it rained nearly all day, less than 100 played golf. In addition to dinner and the distribution of golf and attendance prizes, which had been contributed by more than 150 foundry equipment and supply companies, there was a floor show to conclude the program.

C. N. Spidell, Sand Products Corp., was chairman of the outing committee and he was assisted by: Norm Amrhein, Federal Malleable Co., co-chairman; Marvin Knoller, Electro Refractories & Abrasives Corp.; Walter Knapp, Delta Oil Products Co.; Leonard G. Gratz, G. & O. Pattern Co.; Ed Sadek, Sadek Metal Co.; Herbert Runkel, Lake Shore Sand Co.; M. C. Frankard, Delta Division, Rockwell Mfg. Co.; and Henry Seeboth, Milwaukee Bronze Castings Co. —*John E. Hubel.*

EASTERN NEW YORK Chapter of the AFS held its annual picnic at Endries Willowbrook Inn June 14 with 83 attending. Ray Willey, General Electric Co. (above), demonstrated his art of "map dowsing" to find underground water streams. Photo by courtesy of Howard Bodwell, General Electric Co.

French Foundrymen Hold Annual Convention

Lille, a leading industrial city in the north of France, was the location this year of the 25th annual convention of the Association Technique de Fonderie, May 19-21 under the chairmanship of this year's president, Paul Muguet, of Societe de Commentry-Fourchambault et Decazeville. In addition to members of the association, visitors attended from Belgium, Western Germany, Great Britain, Italy and the Netherlands.

Seventeen papers were presented at the various sessions. Etienne Sauterau, in charge of the steel department of the Centre Technique de Fonderie, contributed a paper on "The Use of Extensometers and Straingages in the Steel Foundry." Etienne Doat, in charge of the cast iron department, and Francois Danis of the same department of the Centre Technique, presented a paper entitled "Correlation between Various Mechanical Tests for Gray Irons."

"Classic Mechanical Tests—Effects of the Modes of Operation on the Correlation of Results" was the title of a joint contribution by Lucien Sousstre, head of the laboratories of the Centre Technique, and Pierre Broouet, of the same laboratories. H. de Leiris, naval engineer, discussed "The Rupture in Service of Castings Subjected to Cyclic Strains." A paper entitled "Remarks on the Measurement of the Modulus of Elasticity in Cast Irons" was contributed by Professor Le Rolland and Mme. Plenard.

Jean Gelain, joint director of Research at the Centre Technique de Fonderie, presented a paper entitled "Remarks on Atmospheric Risers." Joseph Leonard, past president of the Belgian foundry association and of the International Committee of Foundry Technical Associations, contributed a paper entitled "Porosity, Solidification Period of the Phosphide Eutectic." Another paper contributed by the Centre Technique de Fonderie, was by Pierre Nicolas, head of the raw materials division. His subject was "Life of Clay in Molding Sands." Principal Engineer Meyer's contribution was on "Corebinders for

(*Concluded on page* 162)

Why are U. S. Rubber grinding wheels chosen to grind Pearlitic Malleable Iron?

To grind gates from castings of Pearlitic Malleable Iron, the grinding must be done very quickly, at great pressures, so that there is no time for excessive heat to build up. Not only must the wheel cut rapidly and cool but also it should be wear resistant to provide economy. Special tailor-made wheels by United States Rubber Company are the only wheels which this foundry has found suitable for the job.

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(*Concluded from page* 160)

the Foundry."

The exchange paper of the Institute of British Foundrymen was by P. G. Pentz and G. L. Harbach; their subject was "Progress with Synthetic Resin Corebinders." The German exchange paper, by Dr. Franz Roll, was on "Contribution to the Microscopic Examination of Corebinders."

Georges Ulmer, head of thermic studies at the Centre Technique, and Maurice Decrop, his assistant, presented a paper on "Portable Drying Stoves."

Five papers dealt with nonferrous and light alloys. "Quench Burns in Heat Treated Light Alloys" was the title of a paper contributed by Henry Garnier of Centre Technique de l'Aluminium. Louis Grand, of Cie Pechiney, Chambery, contributed a paper entitled "Study of a Light Alloy Casting Submitted to Static and Dynamic Stresses." A contribution by Georges Blanc, director of research, and Pierre-Julien le Thomas, engineer, at Centre Technique de Fonderie was entitled "Elimination of Aluminium in Tin Bronzes." Marcel Cirou, head of the non-ferrous division of the Centre Technique presented a "Study of the Rate of Pouring in Non-ferrous Alloys." "Note on the Manufacture of Precision Pattern Plates" was contributed by Bernard Faure of Fonderies Faure et Cie. This was accompanied by a colored film.

Between the technical sessions, visits were organized to the works of Cie. Fives-Lille, a large engineering works operating a steel and an iron foundry, and to the coke ovens of Henin and Drocourt.

CINCINNATI Chapter of the AFS held its annual golf party and picnic June 9 at Summit Hills Country Club, Fort Mitchell, Ky. At top, Burt Genthe, S. Obermayer Co., Cincinnati, (left) chapter chairman elect, presents gift to William Schneble, Advance Foundry Co., Dayton, O., retiring chairman. Below, left to right, are golfers Tom Collins, Aluminum Industries Inc.; Jim Salzman, Powell Valve Co., and William Clark and Bud Hoffheimer, Buckeye Products Co. Photos furnished through courtesy of G. T. Fredstrom

International Labor Group Issues Reports

International Labor Organization, a specialized agency associated with the United Nations, recently met at Geneva, Switzerland. Worker, employer and government delegates from 20 leading metal trades nations discussed developments and problems in the metalworking industry in their respective countries. Three reports cover the agenda for meetings of the metal trades committee and the iron and steel committee. They are available in printed form from International Labor Office, Washington Branch, 1825 Jefferson Pl., N. W., Washington 6.

Titles of reports of the metal trades committee are: "General Report," "Human Relations in Metal Working Plants" and "Factors Affecting Productivity in the Metal Trades." The set costs $2.

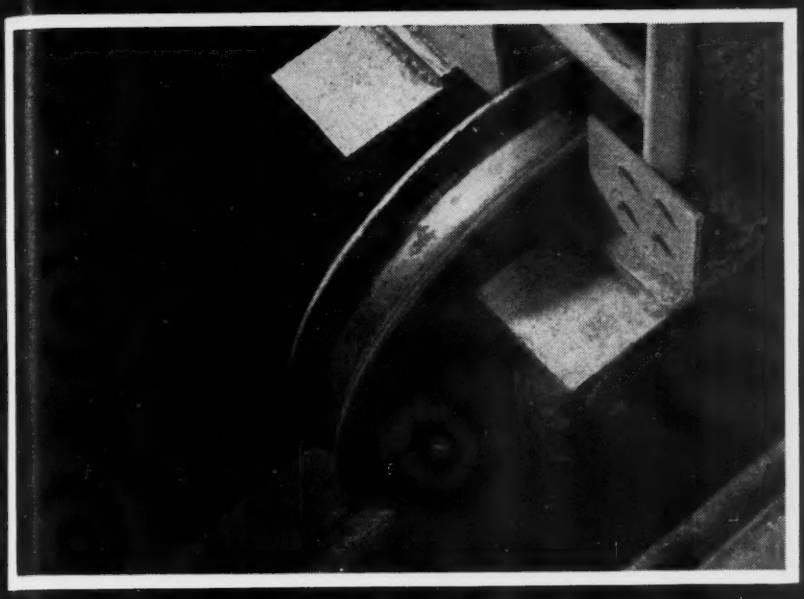
Iron and steel committee reports are: "General Report," "Vocational Training and Promotion in the Iron and Steel Industry" and "Welfare Services in the Iron and Steel Industry." Set is priced at $1.50.

Gray Iron Research Group Moves, Elects Officers

The Gray Iron Research Institute Inc. has moved from its former quarters at 1300 Grandview Ave. to larger ones at 870 West Third Ave., Columbus 8, O. The new facilities will include laboratory as well as office space for an intensive program of plant research and development.

Karl G. Presser has been named assistant director of the Institute. Mr. Presser formerly was with Superior Engine Division, National Sup-

(*Concluded on page* 165)



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(*Concluded from page* 162)

ply Co., Springfield, O., first as chief metallurgist, and more recently as foundry superintendent. In his new capacity he will devote most of his time to the application of research developments to plant practice.

At the annual meeting of the institute in Cincinnati, the following officers were elected: E. C. Hoenicke, Eaton Mfg. Co., Cleveland, president; W. L. Seelbach, Superior Foundry Inc., Cleveland, vice president; S. C. Clow, James B. Clow & Sons, Chicago, secretary; and J. L. Brooks, Muskegon Piston Ring Co., Muskegon, Mich., treasurer. W. A. Kramer, Advance Foundry Co., Dayton, O., was elected to the executive committee for a three-year term, and T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va., was appointed chairman of the research committee for two years.

Metal Congress and Show To Be in Philadelphia

The 34th National Metal Congress and Exposition will meet in Philadelphia October 18-24. Four co-operating engineering societies will sponsor the meeting: American Society for Metals, American Welding Society, Society for Non-Destructive

(*Concluded on page* 168)

Vocational Students Learn Foundry Work

By THOMAS T. LLOYD
Albion Malleable Iron Co.
Albion, Mich.

STEADY progress has characterized the foundry orientation program initiated last fall at Battle Creek Vocational School, Battle Creek, Mich., by Central Michigan Chapter of the AFS. Purpose of the program is to acquaint students with the foundry's place in industry by integrating certain phases of foundry work with already established courses at the school.

Program was developed through co-operation of R. S. Hale, director of industrial training, Battle Creek Public Schools; David W. Boyd, Engineering Castings Inc., Marshall, Mich., chapter educational chairman; Prof. C. C. Sigerfoos, Michigan State College, and Ashley B. Sinnett, FEF scholarship student at MSC. Considerable time and effort also were contributed by Frank B. Rote and Patrick Settanni, Albion Malleable Iron Co., Albion, Mich., and Jack F. Secor, Hill & Griffith Co., Niles, Mich.

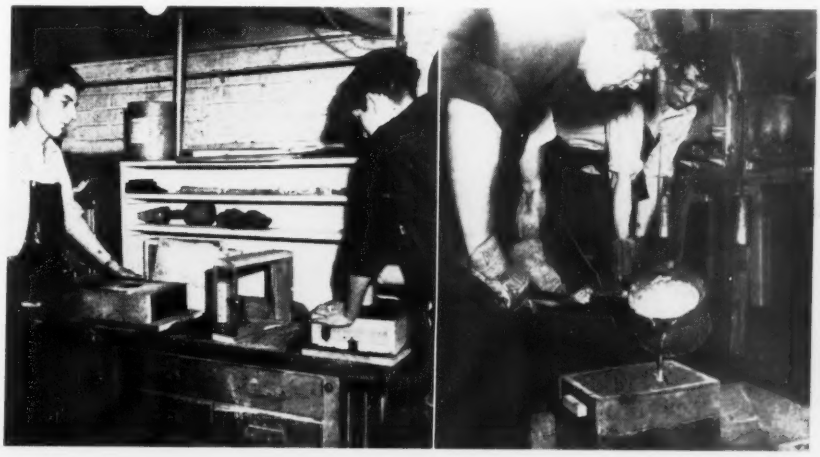
The four at left, left to right, are: R. S. Hale, G. Avery Aten, F. B. Rote and T. T. Lloyd, Albion Malleable Iron Co., chapter chairman. Behind the students at right are: D. W. Boyd and Patrick Settanni

A step-by-step procedure, laid out by Mr. Sinnett, enables the students to draw on past experience and co-ordinate it with foundry functions. The procedure provides a basic, overall conception of the foundry business. Students have been guided in their work by G. Avery Aten, Battle Creek Public School instructor, with the help of Instructors H. A. Colburn and A. W. Anderson. Frequent visits to the school by chapter members who offer advice on foundry procedures and problems have supplanted the need for formal education or lectures. Plant tours at Albion Malleable Iron Co. and Engineering Castings Inc. have given the students an idea of practical foundry operation.

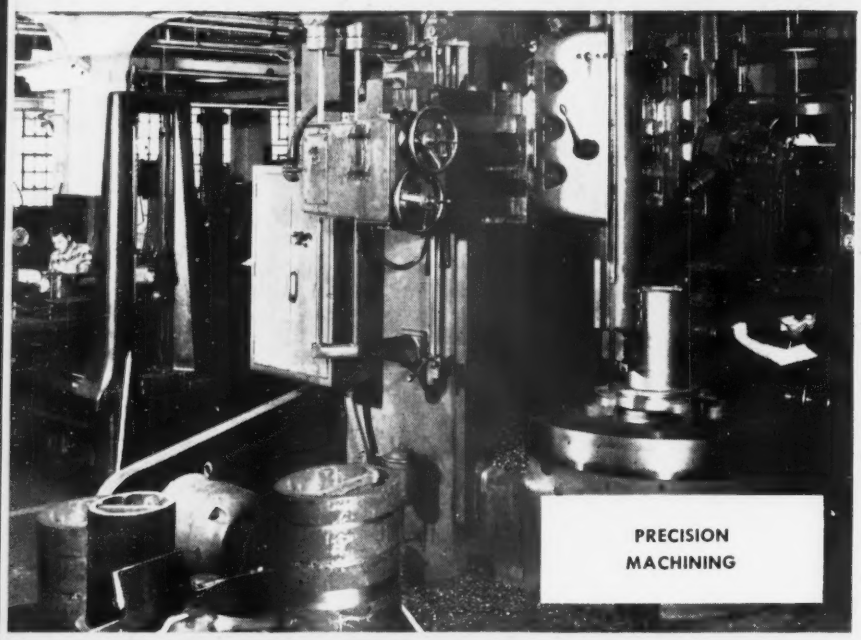
Items made by the students thus far have included a paper punch, drill holders, gage holders, draw shaves, castings for a bench grinder, and other miscellaneous parts. All items first are designed in the school's mechanical drawing class; patterns, coreboxes and other equipment are made in the woodworking class; cores, molds and castings, of course, are made in the foundry, and machining and assembly of the parts is done in the machine shop.

Some equipment and a text, *Foundry Work*, were furnished by Central Michigan Chapter, but much of the equipment has been made by the students. Local foundries contributed sand and scrap aluminum, the students supplementing their metal stocks with their own scrap drive.

Left: Student at right of bench is ramming up a cope to place over the completed drag at left. Right: Pouring off an aluminum heat into sand molds. Flasks were made by students in the woodworking class



PRECISION
LAYOUT



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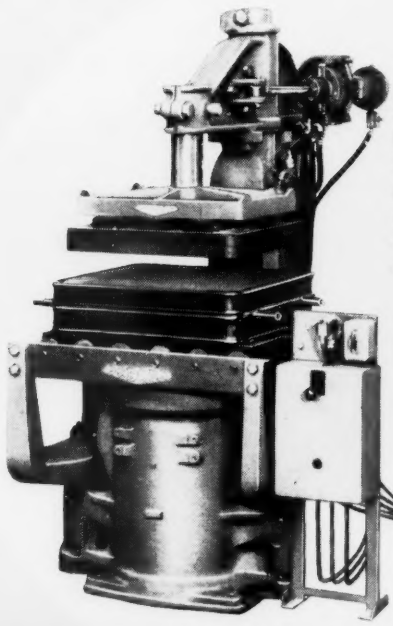

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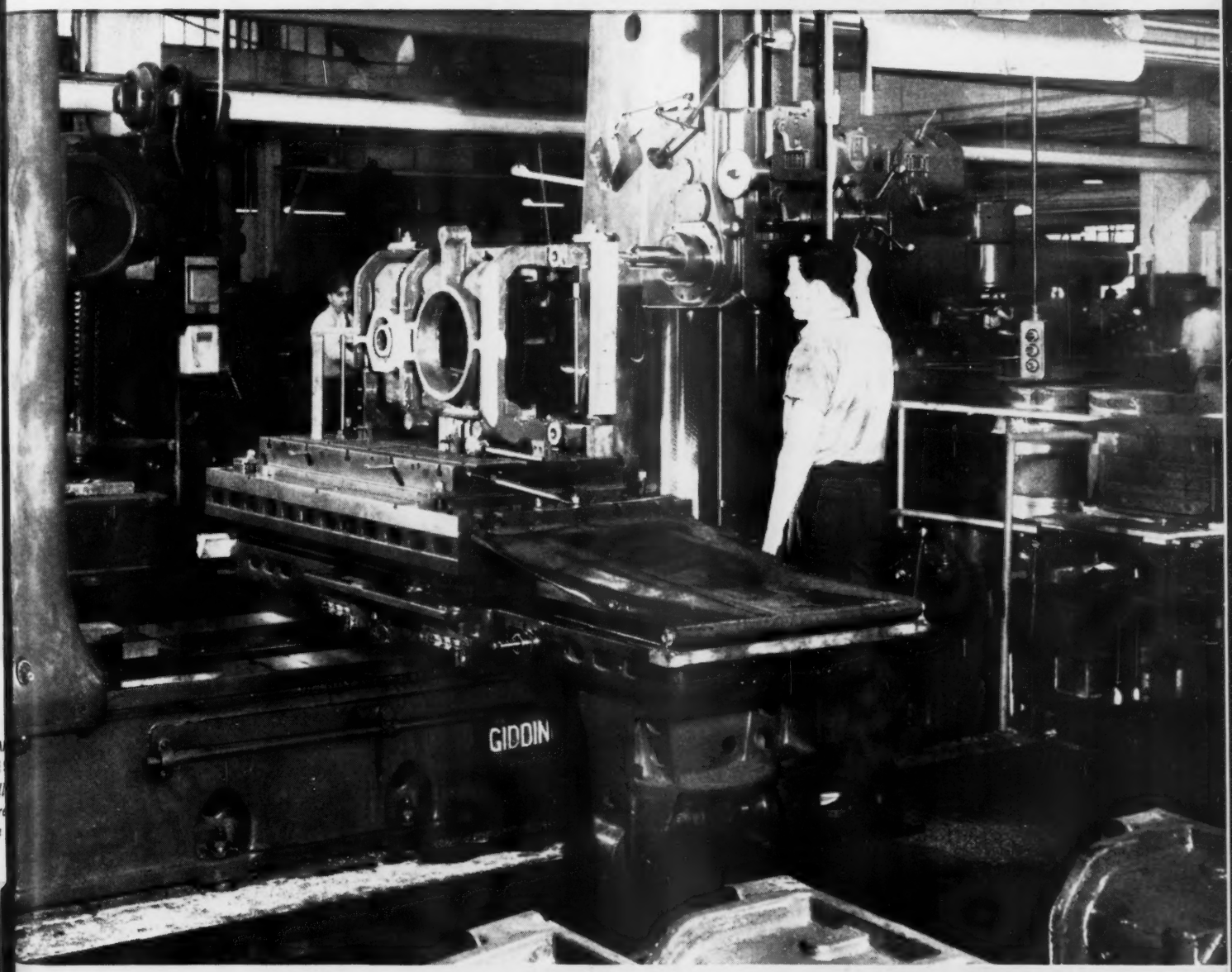

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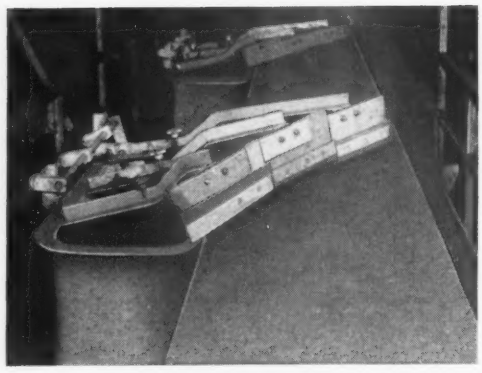

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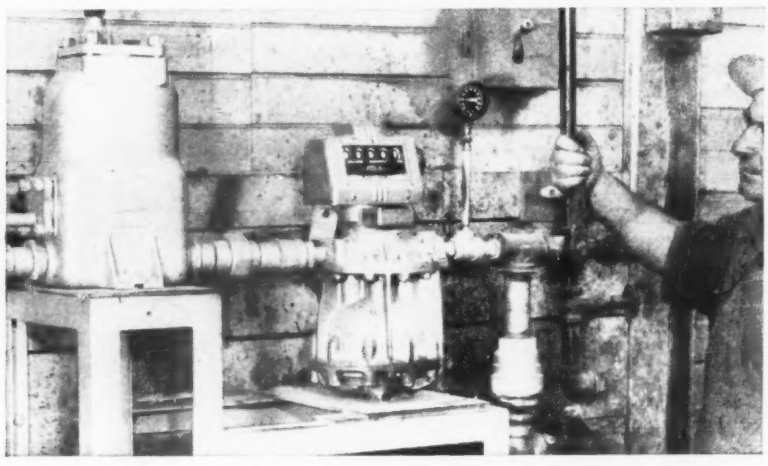

This Bowser metering system is accurately measuring core oil into the sand muller. Another Bowser meter makes sure that the exact quantity of water is used.

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(*Concluded from page* 165)

Testing and American Institute of Mining and Metallurgical Engineers.

Technical sessions of ASM will cover methods of research, high temperature phases, creep rupture and recrystallization, phase transformation, hardenability, delayed yield phenomenon, determination of oxygen in metals and metal oxides by the isotopic method, the indium-arsenic system, temper brittleness and elevated temperatures. Exhibits will depict production, fabrication, and application of metals.

New Laboratory at MIT

Massachusetts Institute of Technology recently dedicated a new metals processing laboratory building, provided by a gift of the Alfred P. Sloan Foundation Inc. Located on the main M.I.T. campus at the corner of Massachusetts Ave. and Vassar St., the building measures approximately 52 by 244 feet and has 67,000 gross square feet of floor space. Ground and first floors and part of the second are devoted to instruction and research, remaining part of the second and all of the third floor are devoted to metalworking and powder metallurgy equipment.

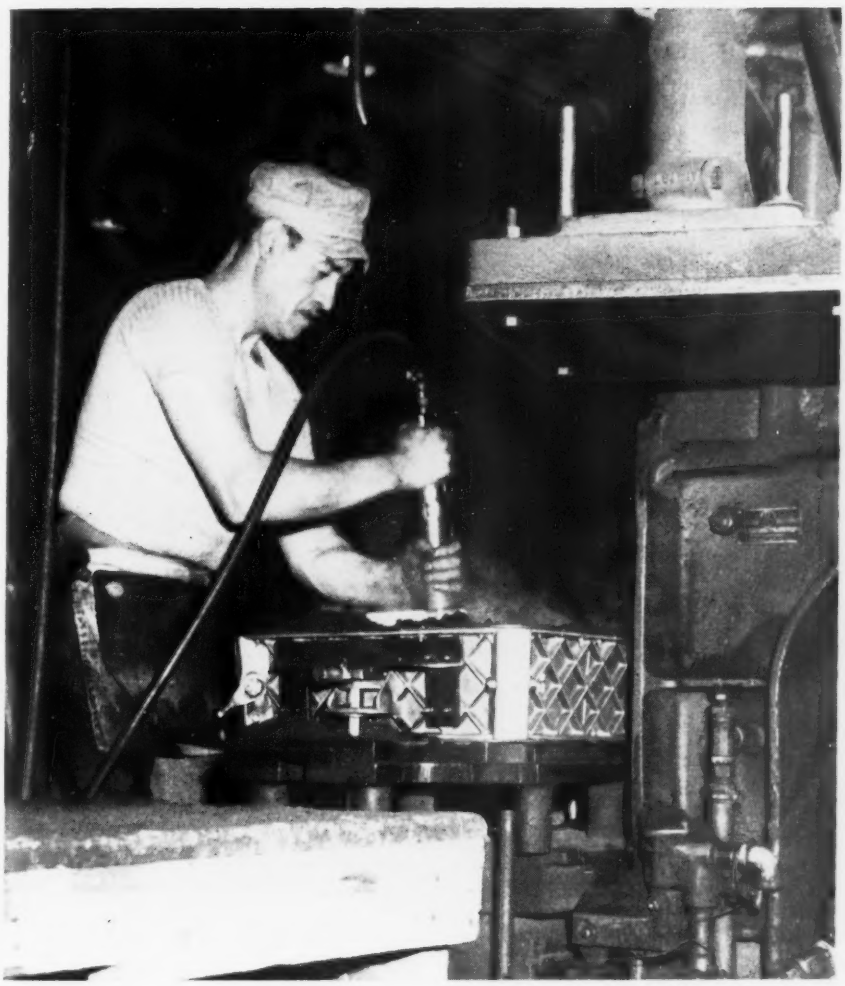
Fourth floor contains a well-equipped foundry and welding laboratory. A glass enclosed structure providing excellent light for foundry operations, its equipment includes a 3-phase electric arc furnace, 175 KVA induction furnace, two cupolas, nonferrous melting furnaces and auxiliary equipment. Separate rooms off the main foundry bay house facilities for pattern making, die casting, special casting processes and storage. Equipment for the laboratory, particularly in the foundry, has been given by Steel Founders' Society of America, Foundry Educational Foundation, and organizations and donors in the industry.

Book Review

Metallkunde, Band I, Aufbau der Metalle und Legierungen (Metallurgy—Structure of Metals and Alloys), by Heinz Borchers, paper, 110 pages, 4 x 6¼ in., published by Walter de Gruyter & Co., Berlin, Germany. Price 2.40 DM.

This volume in German is one of a series on metallurgy and is concerned with the structure of metals and alloys. It is divided into nine chapters, including the problem of metallurgy, extent and importance of metals, structural components of metals, single phase, binary, ternary, and polyphase systems, phase rules, and a bibliography.

HOW THIS FOUNDRY GOT SIX PERCENT MORE OUTPUT WITH CLECO BENCH RAMMERS



A large western foundry has six mechanized lines making small castings. They were using hand rammers on all the lines but they decided to make a comparison using Cleco "OB" Bench Rammers. Here's what they found:

1. Cleco Rammers cut ramming time about 35 percent.

2. Production of lines using Cleco Rammers was about *six percent above* the lines where hand rammers were used.

3. Uniformity of castings was improved. There was less swelling, fewer rejects and less clean-up time.

4. Operator fatigue was reduced.

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SPECIFICATIONS FOR HEAVY-WALLED CARBON AND LOW ALLOY STEEL CASTINGS FOR STEAM TURBINES

ASTM Designation: A—52T

Issued, 1952

(Concluded from the August issue)

Number of Tests

9. (a) One tension test shall be made from each heat in each heat treatment charge and from each casting on which attached coupons are specified.

(b) If any tension test specimen shows defective machining or develops flaws, it shall be discarded and another substituted from the same source.

(c) If the percentage elongation of any tension test specimen is less than that prescribed in Table II and any part of the fracture is more than $\frac{3}{4}$-in. from the center of the gage length, a retest shall be allowed.

Retest

10. If the results of the mechanical test for any lot or casting do not conform to the requirements specified, such lot or casting may be reheat treated and retested.

Microstructure

11. (a) There shall be no microstructure requirement for grade 1. The requirements as to microstructure of the castings to all other grades shall be a matter of agreement between the manufacturer and the purchaser.

(b) One examination for microstructure, when required, will be made for each required tension test. Unless otherwise specified, the sample for microexamination may be taken from the end of the broken tension test specimen indicated in Fig. 1.

Hydrostatic Test

12. (a) Each casting, after machining, shall be hydrostatically tested to such pressures as agreed on between the manufacturer and the purchaser, and shall show no leaks.

(b) It is realized that the foundry cannot perform the required pressure testing on unmachined castings. Castings ordered in the rough state

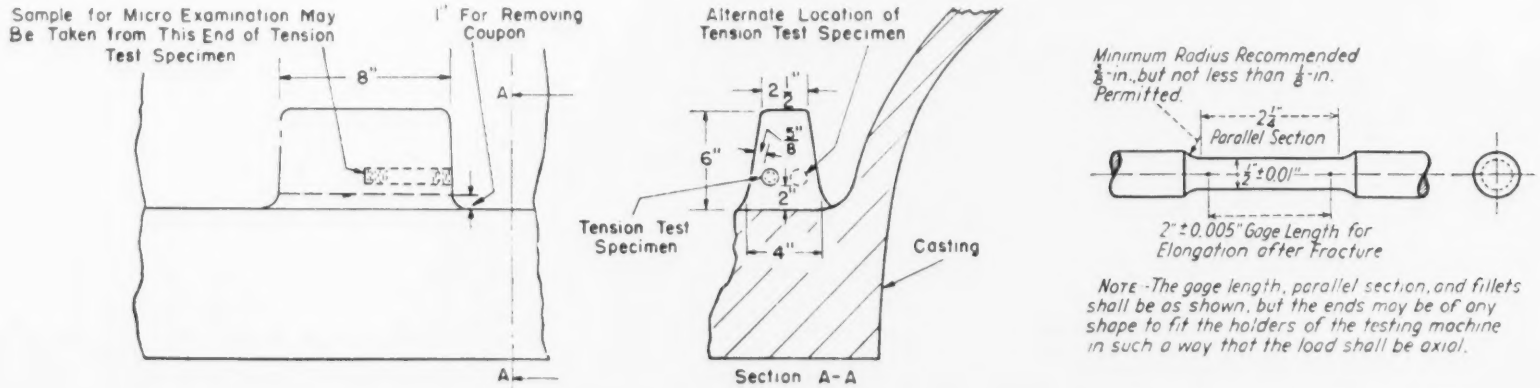
Sample for Micro Examination May Be Taken from This End of Tension Test Specimen
1" For Removing Coupon
8"
A
A
Alternate Location of Tension Test Specimen
2½"
6"
⅝"
2"
Tension Test Specimen
4"
Casting
Section A-A
Minimum Radius Recommended ⅜-in., but not less than ⅛-in. Permitted.
2¼"
Parallel Section
½"±0.01"
2"±0.005" Gage Length for Elongation after Fracture
Note—The gage length, parallel section, and fillets shall be as shown, but the ends may be of any shape to fit the holders of the testing machine in such a way that the load shall be axial.

Fig. 1 (Left)—Dimensions and location of test coupons for turbine castings
Fig. 2 (Right)—Standard round tension test specimen with 2-in. gage length

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13

PROPOSED TENTATIVE

SPECIFICATIONS FOR HEAVY-WALLED CARBON AND LOW ALLOY STEEL CASTINGS FOR STEAM TURBINES

ASTM Designation: A—52T

Issued, 1952

for final machining by the purchaser may be hydrostatically tested by the manufacturer at pressures agreed upon with the purchaser. However, the foundry is responsible, as required under Section 19 (b), for the satisfactory performance of the castings under the final test required in Section 12 (a).

Magnetic Particle Inspection

13. (a) When so specified in the inquiry, contract, or order, and when mutually agreed upon by the manufacturer and the purchaser, castings made in accordance with these specifications may be subject to magnetic particle inspection.

(b) Areas to be magnetic particle inspected, number of pieces made from the same pattern which shall be magnetic particle inspected, and standards of acceptability shall be agreed upon by the manufacturer and the purchaser.

(c) When so specified the magnetic particle inspection shall be made in accordance with the Tentative Method of Magnetic Particle Testing and Inspection of Commercial Steel Castings (ASTM Designation: A 272).

Radiographic Inspection

14. (a) If specified in the inquiry, contract, or order, and when mutually agreed upon by the manufacturer and the purchaser, castings made in accordance with these specifications may be subject to radiographic inspection.

(b) Areas to be radiographed, number of pieces made from the same pattern which shall be radiographed, and standards of acceptability shall be agreed upon by the manufacturer and the purchaser. The standards of acceptance shall be selected from the Tentative Industrial Radiographic Standards for Steel Castings (ASTM Designation: E 71) for X-ray and gamma ray inspection.

Workmanship

15. The castings shall conform substantially to the sizes and shapes indicated by the drawings or patterns submitted by the purchaser.

Finish

16. (a) The castings shall be free from injurious defects and satisfactorily cleaned for their intended purpose when offered for inspection.

(b) *Repair by Welding.*—The repair of defects by welding shall be subject to agreement between the manufacturer and the purchaser.

Marking

17. The manufacturer's name or identification mark, the pattern number, and the number of the heat used to pour the casting shall appear on each casting on delivery. If the composition is to be identified, the specification number and grade number will also appear on each casting. The location, sizes and types of identification shall be as agreed between the manufacturer and the purchaser.

Inspection

18. The inspector representing the purchaser shall have free entry at all times and to all parts of the manufacturer's works that concern the manufacture of the material ordered, while work on the contract of the purchaser is being performed. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests (except check analysis) and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

Rejection

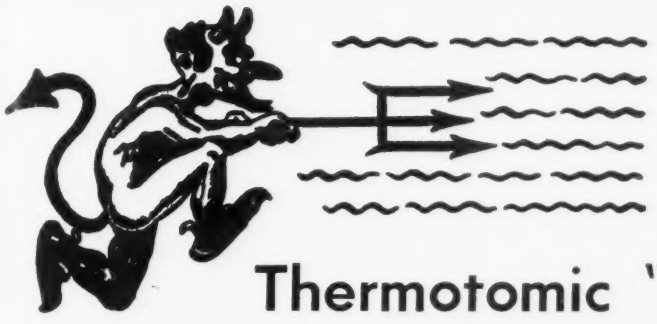
19 (a) Unless otherwise specified any rejection based on tests made in accordance with Section 6 shall be reported to the manufacturer within five working days from the receipt of samples by the purchaser.

(b) Material that shows injurious defects subsequent to its acceptance at the manufacturer's works will be rejected, and the manufacturer shall be notified.

Rehearing

20. Samples tested in accordance with Section 6 that represent rejected material shall be preserved for two weeks from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

New Head Compound Saves Metal!



Soffel's New Thermotomic "HOTOP" Liquidizer

AN EXOTHERMIC CARBON FREE LIQUIDIZER FOR IRON, STEEL, NODULAR IRON

Produces more castings per heat through savings of feeding metal in risers or feeding heads which can now be reduced in height 40 to 70% of their diameter.

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is different from other head compounds in that HOTOP LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorous and can be used without danger of contamination on any ferrous metal or alloy.

HOTOP LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. HOTOP LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

GUARANTEED TO PRODUCE SOLID CLEAN CASTINGS

SOFFEL'S FAMOUS CARBON FREE LIQUIDIZER FOR ALL METALS and ALLOYS

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers. When applied on the heads or risers . . . CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding metal will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

SOFFEL'S THERMOTOMIC COMPOUND

PATENTED

FOR ALL METALS and ALLOYS

THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings. This permits easy removal of heads and gates and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixed with molding sand in the mold, heat at thin metal sections is retained until the main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

PITTSBURGH METALS PURIFYING COMPANY

World's Largest Manufacturers of Fluxes and Purifyers For All Metals and Alloys

1352 MARVISTA ST., N. S. PITTSBURGH 12, PA.

Resin impregnation gives added strength and hard surface to these plaster patterns employed in producing aircraft parts

Plaster patterns being cast in sand molds at Northrop Aircraft Inc. Sand particles can be cleaned from solidified plaster without loss of details

Plaster and Plastics Combine in

New Pattern Material

By THOMAS A. DICKINSON

PLASTIC-PLASTER patterns combine the economic advantages of plaster compositions with the physical and chemical merits of plastics.

They are made by casting and dehydrating the least expensive types of plaster, so that the latter can be permeated or impregnated with polymerizable resin solutions. This, in turn, makes it possible to heat-cure the impregnated casts so that they will be comparable to wood or cast-plastic articles for most practical purposes, despite a much lower cost.

The least expensive plasters are desirable in this work because their extreme porosity when cast facilitates the use of resinous impregnants. Virtually all monomeric or liquid resin compounds can in theory be used as plaster impregnants, but only a few are now regarded as practical because:

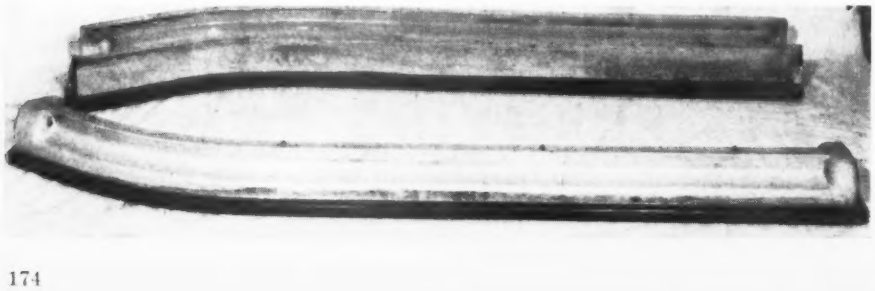
(a) Most unsaturated plastic solutions (that is, resins containing no water or volatile solvents) are extremely viscous "syrups" with macromolecules or molecular constituents which are too large to penetrate plaster pores.

(b) If resins of the latter type are "thinned" with volatile solvents or low-viscosity liquids, plaster pores will absorb the low-viscosity solutions and retain the resinous particles as surface coatings (which are fundamentally the same as lacquer or shellac coatings).

(c) A majority of unsaturated, low-viscosity monomers cannot be satisfactorily polymerized in a reasonably short period of time.

Plaspreg resins made by Furane

(*Continued on page* 177)



Typical patterns made by resin-impregnating dehydrated plaster casts. Cost is said to be low

to get those better BUFFALO PATTERNS"

There was a time when foundries felt that they just had to do business with the pattern shop that was nearest to them . . . even at the expense of quality. That came from a desire to be "on-top-of-the-job" at all stages to check progress.

Now, in this shrunken world of ours, distance has lost its meaning. Top-notch engineering, craftsmanship and speed are the sought-after factors in the pattern business...no matter *where* they are to be found! At least, that's the case here at Buffalo where our customer list includes names from all the country's leading industrial centers.

Why do they all come to Buffalo? That's simple! Here they have found engineering that COMPLETELY plans *each* job and the kind of craftsmanship that saves them plenty of money. There is never any adapting or extra rigging to do on a Buffalo Pattern. The equipment will fit your foundry and production schedules like a charm. And, once you're in production, you'll find the biggest plus; the lowest scrap ratio you've ever known.

BE OUR GUEST

Just let us know when you are coming to Buffalo on pattern business. One of our cars will meet you at your plane or train and transport you to our club where you will be our guest during your stay.

Production and Experimental Pattern Equipment • Shell Mold Pattern Equipment • Permanent Molds
Pattern Engineering Drawings • Forging Dies • Non-Ferrous Castings • Shell Mold Castings • Metallizing

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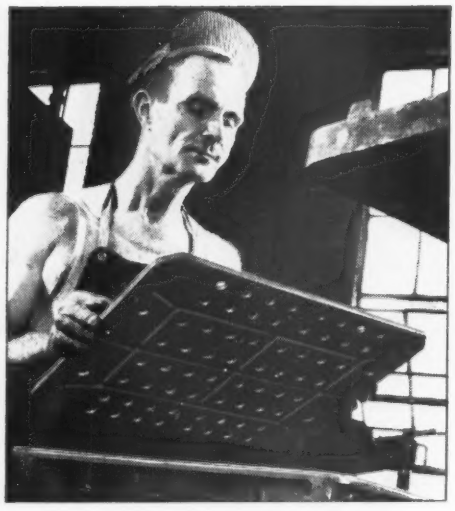
DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

"EDCO BOTTOM BOARDS eliminate swelled castings"



Above photo shows Mid-City Foundry Company molder placing EDCO DOWMETAL Bottom Board on flask preparatory to pressing. Mid-City Foundry produces high quality gray iron and alloy castings.

Take a tip from E. F. Dublinski. He speaks from experience in saying —"EDCO DOWMETAL Bottom Boards eliminate swelled castings". Since switching to magnesium boards, Mid-City Foundry does not have castings ruined through swelling caused by depressions burned into out-dated wood boards.

EDCO DOWMETAL Bottom Boards help produce castings that are true to pattern. The exclusive grooved and vented design permits escape of gasses, and insures mold stability. Causes for rejects are kept to a minimum.

"We consider EDCO DOWMETAL Bottom Boards as permanent equipment at Mid-City," adds E. F. Dublinski, "because they'll outlast wooden boards at least 30 to 1 and in no time at all pay for themselves."

Your molders will like handling these boards because they are light in weight, easy to stack, and there's no danger of splinters. EDCO DOWMETAL Bottom Boards will not warp or rot—there are no nails to come out, nothing to break or split—no upkeep.

Write us, or phone CApitol 7-2060 for price schedule and list of 74 standard sizes available from stock.

CHRISTIANSEN CORPORATION

1517 N. KILPATRICK AVENUE • CHICAGO 51, ILLINOIS

Aluminum Alloy Ingots • Zinc Base Casting Alloys

(*Continued from page* 174)

Plastics & Chemicals Co., Glendale, Calif., are available as low-viscosity monomers which can be easily polymerized. They are inexpensively derived from agricultural wastes (such as oat and cotton seed hulls) and have many desirable physical properties when polymerized, as shown in an accompanying table.

Like other furan (or furane) resins, Plaspreg compositions have inherently-dark (brownish-black to tan) colors, which cause plaster casts to look like wood.

Plaster materials are mixed, cast (or otherwise fabricated), deaired, cleaned up or patched, and dehydrated in a very conventional manner prior to impregnation. Careful dehydration is essential because moisture in a plaster article will naturally limit the penetration of a resinous impregnant, and "slick spots" (due to the use of parting agents in plaster casting molds) should be removed from the plaster surfaces by lightly rubbing with fine sandpaper so that the penetrating action of the impregnant will be uniform.

PHYSICAL PROPERTIES OF RESIN-IMPREGNATED PLASTERS*

Specific gravity	1.75-1.80
Specific volume, cu. in. per in.	15.8
Tensile strength, psi	8000
Flexural strength, psi	6000
Compressive strength, psi	15,000
Modulus of elasticity, tension, psi x 10^6	15.8
Rockwell hardness	110
Heat resistance (impregnant only)	265° F
Water absorption, 24 hours	2%
Effects of age and weather, 1 year	none
Resistance to acids, alkalies, solvents	very good
Natural colors	tan to black
Machining qualities	fair
Warpage or shrinkage	none

*Average values for plaster of Paris castings, impregnated with standard Plaspreg resin.

Then the impregnant is prepared by mixing one part acid catalyst with each five parts of resin by weight or by volume. Three different Plaspreg resins and catalysts are now being used as plaster impregnants, and the selection of any one resin-catalyst combination for a given application should depend on the following considerations:

1. Standard type—can be used for a week after the resin-catalyst mix is prepared, if properly stored in a closed container; cures at temperatures of 150 to 170°F in 18 to 24 hours, and has a dark brownish-black color when polymerized.

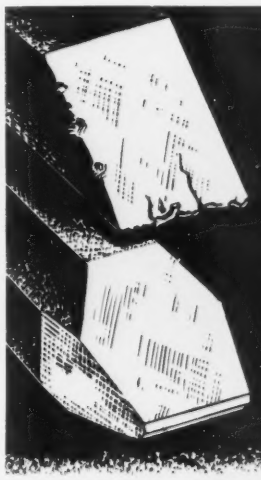
2. Type "A"—should be used within two hours after the resin-catalyst mix is prepared; will completely cure at room temperature in a few days, or at 100 to 120°F in 8 to 12 hours, and has a light tan or old ivory color when polymerized.

3. Type "S"—May be used for one or two days after the resin-catalyst mix is prepared; will cure at temperatures of 110 to 130°F in 6 to 12 hours, and has a medium brown or walnut hue when polymerized.

Identical resin-catalyst proportions are specified in mixing all of the above impregnants, and plaster casts can be impregnated by immersion or by using the catalyzed resins like lacquer or shellac coatings. As a rule, it is desirable to impregnate small articles by dipping them in the solutions so that each will be completely submerged for two or three minutes. Large articles are usually impregnated with a rapid sequence of brush or spray coatings (number of which can be determined in each circumstance by the fully-impregnated appearance of the plaster.)

Incidentally, metal or fiber reinforcements in plaster articles will not appreciably reduce the penetrating action of a plastic resin. However, the use of such reinforcements is

(*Concluded on page* 180)



Half-Cracked Tools *Give You* Half-Cracked Results

How long would the fragile cracked chisel last on a job? Most grit fails quickly, too.

HERE'S WHY! All grit is made by crushing shot. How you crush it makes the difference. Ordinary methods twist and pull the material during crushing. Result—half-cracked grit loaded with worthless awkward shapes. In use, particles breakdown quickly and cannot do a first-rate cleaning job.

On the other hand, the Ball Mill method produces fracture-free grit. The solid chunky particles can take plenty of hard knocks. Why?—because the Ball Mill crushes with a direct solid impact—no pulling or twisting. Industrial uses the Ball Mill process *exclusively*. IMA Ball Mill Grit does a better job longer.

WANT PROOF? Attach coupon to your letterhead and mail today. We'll send you a sample to compare with the grit you're using.

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Manufacturers and Distributors of Heat Treated Chilled Shot and Grit, Cold Drawn Steel Shot, and Malleable White Iron Stars.

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SHOW ME!! Send sample of IMA Ball Mill Grit size_____

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ADDRESS_____

CITY_____ ZONE_____ STATE_____

Herman MOLDING

This Foundry Is A Good Place To Work

• This modern Milwaukee foundry is the largest producer of electric steel castings in the area. Its capacity, using 4-ton electric furnaces, is 1500 tons per month. Largest percentage of production goes into castings for power shovels . . . other castings being used in hydro-electric, steam turbine and mining machinery applications.

An elaborate dust collection system is one of several reasons this foundry is a good place to work. This system operates throughout the plant . . . shakeout, sand blast rooms, furnace smoke, grinders, etc. Concrete floors are used throughout most of the plant, whose property covers 14 acres. Flexible production facilities enable the plant to turn out castings ranging from under one pound to 12,000 pounds. There are 550 employees. A working committee of 20 men represents all employees at regular bi-monthly meetings, to discuss details of plant working conditions. Careful consideration is given to all suggestions.

MAYNARD ELECTRIC STEEL CASTING CO.

The Herman Jarr roll-over machine illustrated is typical of the 12 machines this plant uses, ranging from 1500 to 10,000 pounds' capacity. There are several points to remember about all Herman machines: No power is required for the roll-back operation; Extremely long pattern draw distance; Hydraulic roll-over and pattern draw permits smooth, easily controlled operation; One rotary valve handle controls the complete operation. For added information, just get in touch with us at the address below. Herman machines have made their way by the way they're made.

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

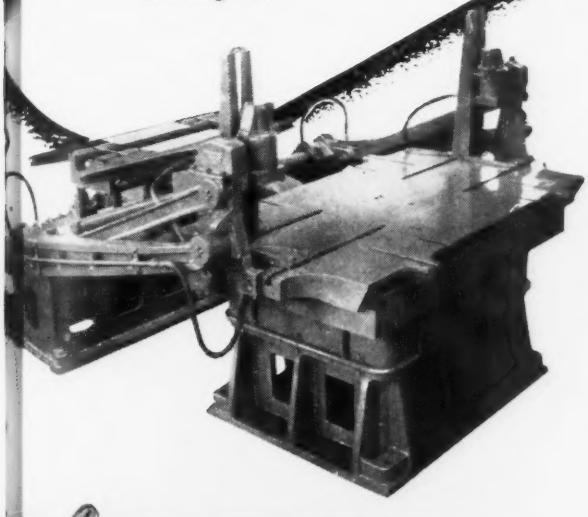
The ad reproduced herewith originally appeared in the February, 1949 issue of FOUNDRY.

GMACHINES

help make this foundry a good place to work...

because— "We have had various types and sizes of Herman Molding Machines in operation in our plant since the early 1920's, and have considered them very desirable for our class of production. In fact, we believe that the use of Herman Molding Machines in our production of steel castings has placed us in an enviable position with our customers, due to satisfactory production of high-grade steel castings for their use."

O. H. SCHILDKNECHT,
SALES MANAGER
Maynard Electric Steel Casting Co.



The above statement from another leading U.S. foundry is further proof of the versatility, dependability and good engineering of Herman Molding Machines. This foundry, and thousands of others throughout the world, are using these machines because they fulfill foundry production requirements in terms of rugged design and simple operation.

One rotary valve handle controls the complete operation of a Herman. All Herman machines develop smooth, fast hydraulic roll-over and pattern draw. No Power is required for the roll-back operation. Your foundry, also, will benefit from the use of the famous Herman Molding Machine. There is a qualified representative near you, or write the address below.

HERMAN MOLDING MACHINES have made their way by the way they're made.

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

(*Concluded from page* 177)

recommended only where the impregnated articles should have maximum impact resistance, because the metal or fiber strands will otherwise serve no useful purpose.

Circulating air is preferable in heat curing impregnated plaster materials, since this will facilitate a uniform chemical reaction; and, if the impregnated articles are large, temperatures should be raised and lowered slowly during the curing cycle to prevent localized overheating.

Excessive heating is undesirable in polymerizing any plastic material, since this will cause the latter to boil or burn. However, slight overheating will not seriously damage an impregnated plaster cast if temperatures are reduced as soon as evidence of too much heat can be observed—in other words, as soon as the resinous impregnant begins to sweat or bleed out of the plaster pores. Needless to say, the latter sweat should be removed from the plaster surfaces before it has a chance to solidify.

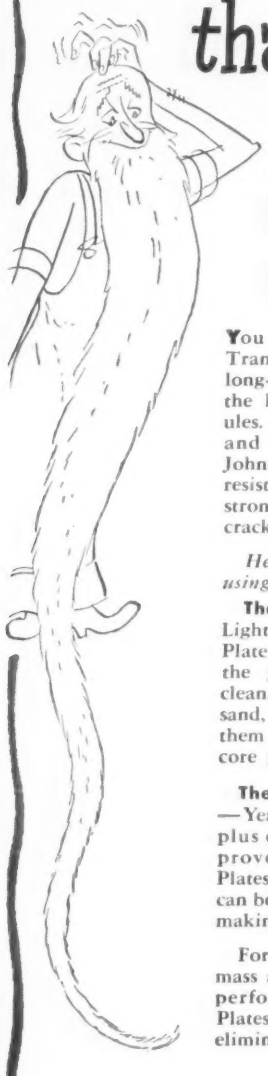
Following curing, an impregnated plaster article has a rather dull or drab finish. This can be brightened without difficulty by buffing the surfaces (after which the article will look like lacquer-finished wood) or, if necessary, by applying a conventional coating to the unpolished surfaces.

Western foundrymen have discovered that resinous impregnants do not appreciably increase the cost of most tools that would ordinarily be fabricated with plaster compositions. However, most foundrymen indicate that resin-impregnated plaster tooling is most advantageous where materials such as wood and castable plastics have heretofore been used instead of plaster compositions.

For example, where the pattern for a shaft could not be made from wood in less than a week or at a cost of less than $500, one company has obtained an impregnated plaster pattern within two days and at a cost of about $100. Similarly, where it was estimated that a phenolic-plastic matchplate would require more than two weeks' work and an expenditure exceeding $2000, an impregnated plaster matchplate has been fabricated in less than a week at a cost of about $750.

Impregnated plaster casts may be drilled or otherwise machined if they must be assembled with one another or with parts comprising other materials, but as a rule they are provided with cast-in metal inserts for assembly purposes.

Looking for core plates that LAST LONGER?



. . . then use TRANSITE CORE PLATES that stay on the job year in, year out

You can rely on durable Transite* Core Plates to give long-term service, even under the heaviest foundry schedules. Made of fibrous asbestos and cement, by a special Johns-Manville process, they resist shock and corrosion, are strong and durable, will not crack or break easily.

Here are more reasons for using Transite Core Plates:

They speed production—Light-weight Transite Core Plates are easier to handle on the job. They're easier to clean, too . . . core wash, sand, etc., do not adhere to them as readily as to other core plate materials.

They maintain accuracy—Years of foundry service, plus exhaustive tests, have proven that Transite Core Plates do not warp readily . . . can be used for precision core making indefinitely.

For core plates of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 60, New York 16, N. Y.

JM PRODUCTS

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES

Made of Asbestos

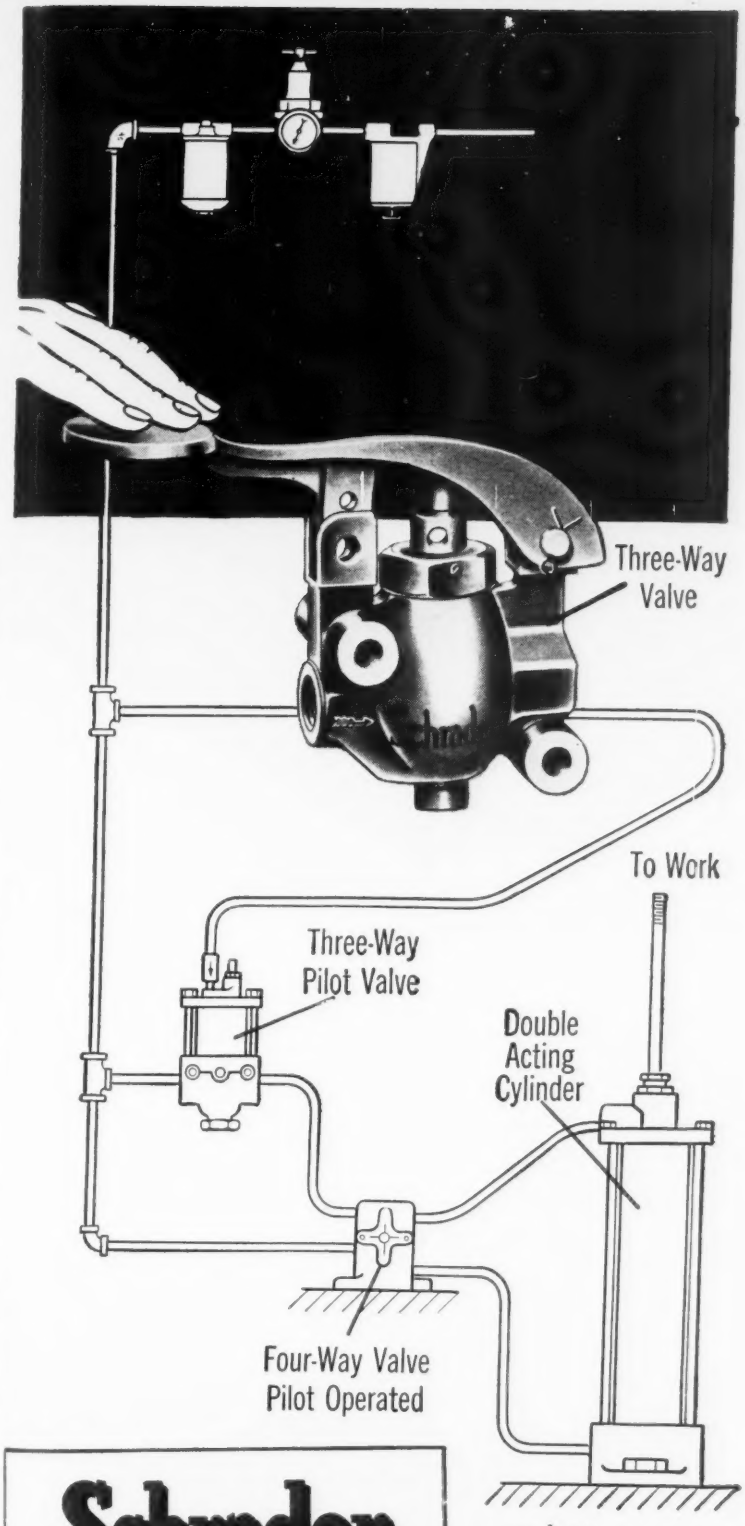
Book Review

Economics of American Manufacturing, by Edward L. Allen, cloth, 566 pages, 6½ x 10 in., published by Henry Holt & Co., New York. Price $6.95.

Highly statistical in nature, this book analyzes the development and world position of American manufacturing as of 1950. The author has selected 19 representative industries and examined each from three standpoints: Its setting in the national economy, the structure of the industry and financial factors.

These industries are divided into five general categories—basic metals, basic nonmetals, metalworking, textile and leather and consumer goods.

One chapter is devoted to each industry, and there are also introductory and concluding chapters. The book contains 208 photographs, 68 diagrams, a bibliography and an index. Mr. Allen is an industrial economist who currently is staff research director of a joint Air Force-Navy project and lecturer in economics at the American University in Washington.



-Air Control Starts with Schrader Valves

To use work ejection . . . clamping . . . and the numerous pneumatic sequence controls that work wonders in the average plant, you need reliable valves.

That's where Schrader Valves come in. Whether your air equipment is actuated by hand, foot, cam or tripper, you'll find a Schrader engineered valve that exactly fits your needs.

With over a hundred different models to choose from . . . each functionally designed to cover a broad range of applications . . . you'll have no trouble finding just the valve you need —one that is compact, easy to install, simple to maintain.

Each Schrader Valve is individually tested to full pressure rating before it is shipped. That's why you're sure of reliable service from every valve that bears the Schrader name.

Whatever your production scheme, it's likely you use air as a tool. And wherever you use air, there's a chance to make its use more effective with valves you can count on—Schrader Valves.

To see how truly practical Schrader Valves are . . . how you can't help but benefit from their use, write, describing your compressed air requirements—or fill out the coupon below.

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Company_____

Address_____

Increasing Scrap Charging in the Cupola

By LEWIS H. GROSS
Foundry Metallurgist
American Radiator & Standard Sanitary Corp.
Baltimore, Md.

DO you hesitate to increase the amount of purchase scrap in your cupola charge?

Good castings can be made from iron melted in the cupola where the charge contains a high percentage of scrap, if use is made of a little metallurgical knowledge.

First consider whether it is economical to charge high percentages of purchased scrap. Scarcity of pig iron may make it a necessity even if the price for purchase scrap is high.

Second, in calculating actual costs of such scrap, it is necessary to figure for a higher melting loss, ranging from 5 to 8 per cent greater than for a like tonnage of pig iron charged. Unloading and handling costs are slightly higher. Also, alloy or cupola additions must be made to offset the lack of and loss of these constituents during melting.

Actually, the usage of a small amount of purchased scrap is beneficial in such shops which have high return remelt of their own. Charging a good grade of scrap introduces new alloys in small amounts while helping to cut down on the combined carbon content of that type of melt.

Carbon in cast iron is its number one constituent, next to iron. In these days when we speak of carbon control and carbon equivalents it is necessary to consider carefully where this carbon is coming from. If we are fortunate enough to have a good supply of pig iron with a silicon content in the range of 2 per cent, probably the carbon pickup from the coke will be sufficient to meet the demands.

However, most charges seldom approach such an ideal combination, and some method is required to increase the total carbons.

Many good articles have been written on calculating the carbon equivalent. Schneidewind and McElwee[1] give the carbon equivalent as an approximate measure of percentage eutectic formed. Barlow and Lorig[2] presented their carbon equivalent concept to show a simple relationship between composition and the physical property of the iron.

Cast Metals Handbook[3] shows the effect of carbon on the mechanical properties. While lower carbon irons show greater strength and more hardness, they are somewhat more difficult to machine.

ASM Metals Handbook[4] states that an increase in silicon content lowers the percentage of carbon in the eutectoid approximately 0.07 per cent for each per cent of silicon in the iron.

Mulcahy[5] touches on the use of graphitizers to improve the physical properties of cupola iron.

Levi[6,7] perhaps put it best in telling how to control total carbons. Use of the best coke in the cupola bed is important. Many foundries hand pick the coke for this part of the operation. Next, the amount and type of coke used between charges is important.

Hot iron will give a higher total carbon iron. Byproduct coke gives higher temperatures and better carbon pick-up.

Using more coke usually results in a higher carbon pick-up. However, and in most cases, the amount of coke that can be used safely and economically is governed by the rate of melt required. Too much coke causes a reduction in melting rate; the size of the cupola being a function in the rate of combustion of the coke used.

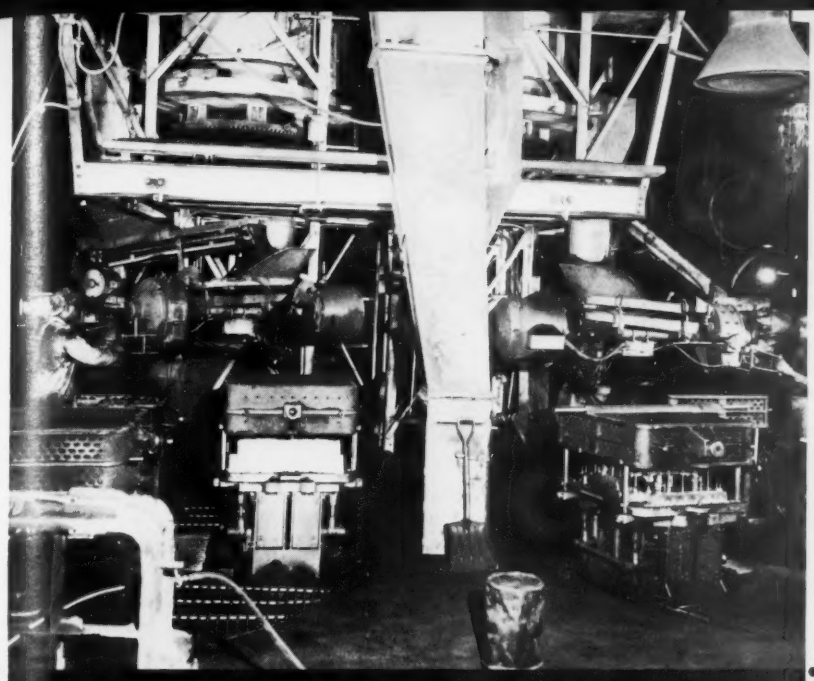
How do we know that higher total carbon is needed in the iron? End use of product, sectional thickness, machinability, grain size and hardness govern demands. A chemical analysis tells what we have. A calculation of the carbon equivalent will tell whether we have a hypo- or a hypereutectic iron. If we have a hypoeutectic or low carbon equivalent, the problem of getting more total carbon will not be difficult. If we already have a hypereutectic, high carbon equivalent, we still may increase the carbon content somewhat, but with more difficulty and on a slightly more costly basis.

Assuming that we are unable to use additional coke, try carbon-raising materials available for such purposes. Total carbon can be raised only by cupola additions of carbon raisers. Ladle additions do not raise total carbon.

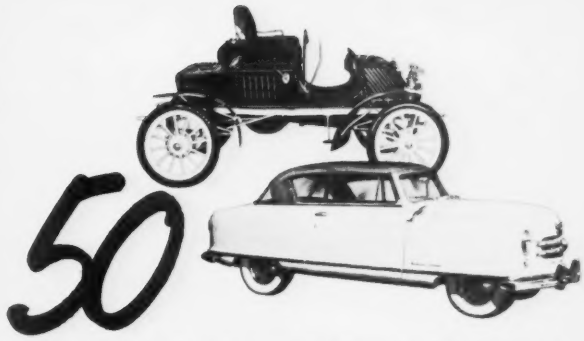
Petroleum cokes are good, but only the sulphur free varieties should be used. This is usually a bulk material of random size. Anthracite coal sometimes is used, but results are variable. Sulphur pick-up may be high. Carbon-raiser, a natural material from New England is good, it is a bulk material of random size. Various grades of crude graphite, bulk form, are imported from Mexico. These are good but results may vary because of high amounts of impurities.

Broken and small ends from carbon electrodes are good. Supply is limited. They are difficult to add in required amounts. Refined and briquetted graphites are good. Results are uniform, material is easy to handle and can be added by counting briquettes, eliminating weighing and irregular addition. The bulk carbon raisers all yield good results, if allowances are made for material losses through breakage, inaccurate weighing and stack losses because of small particles being blown away. Shipping charges add greatly to costs. Geographic location is of importance in

(*Continued on page* 187)



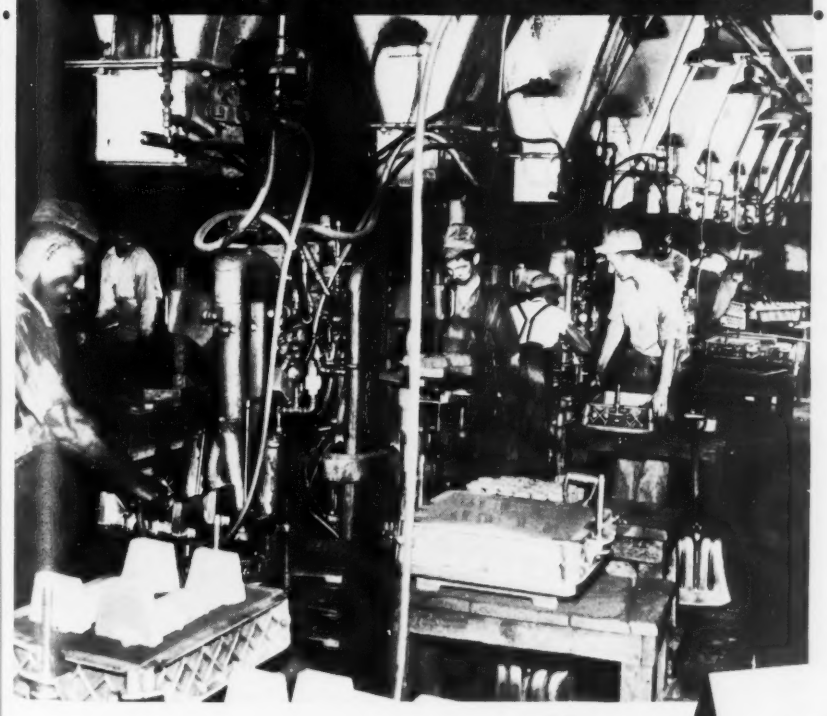
SANDSLINGERS These two slingers, one for copes and one for drags, ram all of Nash's cylinder block molds. Three Champion Speed-Draw Machines are mounted on each B&P Roto-Mold Turntable.



50 YEARS OF PROGRESS AT **NASH**

30 YEARS OF B&P SERVICE TO NASH

CHAMPIONS Nash's newest molding line is equipped with Champion Squeeze and Jolt-Squeeze Molding Machines. A Model "80" Speedmullor with Multrolmatic automatic controls provides sixteen machines with mulled sand.



Recently Kenosha, Wis., celebrated Nash day, marking the fiftieth anniversary of this pioneer auto builder. B&P has served Nash for thirty of those years and today Nash depends on B&P equipment throughout its foundry.

Five out of six Nash production molding lines are built around Sandslingers. The sixth line utilizes Champion squeeze and jolt-squeeze molding machines and is provided with mulled sand by a Model "80" Speedmullor. Nash benefits from B&P equipment and so can you . . . write today —Beardsley & Piper, Div. of Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Illinois.

B&P

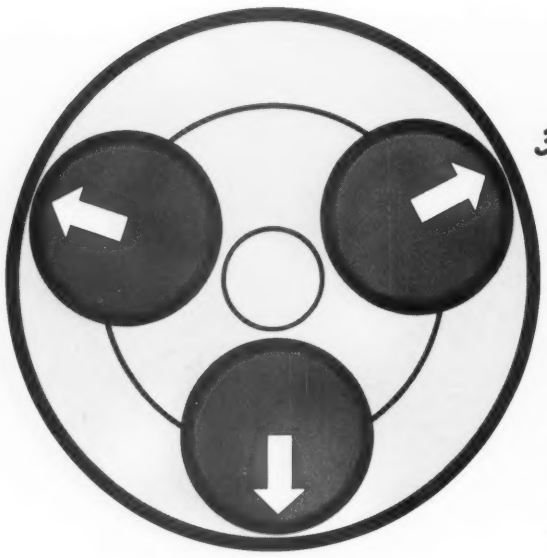
LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

There's no mystery to FOUNDRY SAND MULLING

Mulling is simply the application of work energy to a sand mixture to accomplish complete distribution of bonding materials in a uniform coating around each sand grain. The work is applied in the form of pressure and the thoroughness of mulling depends on the pressure exerted and the amount of sand to which this pressure is applied. *Thus, mulling action depends completely on the pressure and the sand area covered.*

it's a matter of PRESSURE ..



***32.7* p.s.i.** **(compared to 31.5 p.s.i.* in the very latest style of conventional mixer)* **Using the same basis of computation.*

In the Speedmullor, the mulling pressure is applied by light-weight, horizontally-mounted, rubber-tired mulling wheels. Utilizing the modern principle of centrifugal force, the wheels of the Model "80" Speedmullor apply a pressure of 32.7 p.s.i.* to the sand as it is aerated in suspension between the wheel and the rubber-lined bowl. The non-slip efficiency of rubber-to-rubber mulling means full utilization of the mulling pressure. In the very latest style of conventional mixer, the pressure is applied by massive spring-weighted vertical mulling wheels. The maximum mulling pressure, according to the manufacturer, is 31.5 p.s.i.*

3 times as much mulling wi

LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

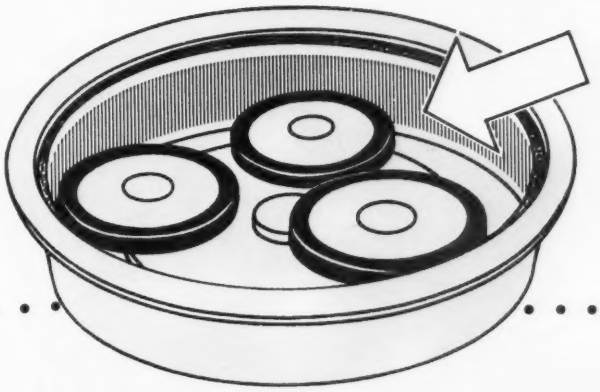
Plows are mounted at the correct angle of inclination and lead to hold the sand in suspension for complete mulling and aeration. Plows are borium coated for long wear.

Centrifugal force is utilized in discharge, too. The large side door permits complete discharge in seven seconds. Nothing left behind to contaminate subsequent batches.

Write for Speedmullor Catalog!

BEARDSLEY & PIPER
Div. Pettibone Mulliken Corp.
2424 N. Cicero Ave., Chicago 39, Illinois

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA



***210,000** square inches per minute of area covered (compared to 78,000 square inches per minute in the latest conventional mixer)*

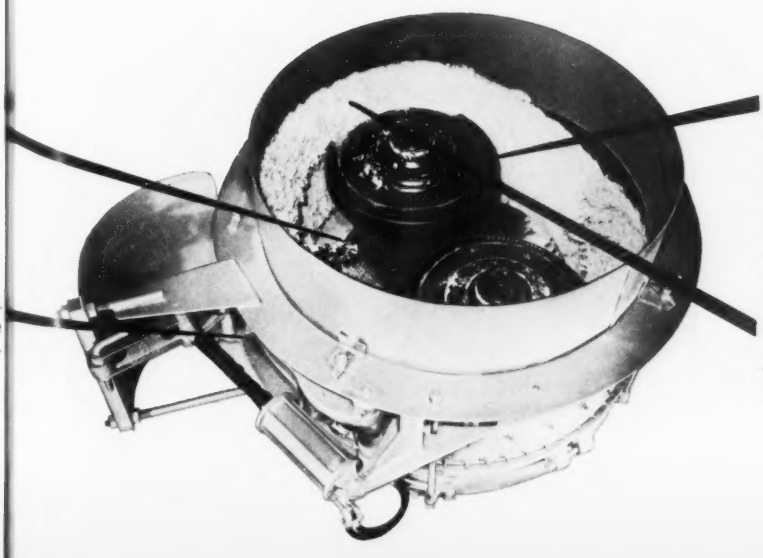
...and AREA COVERED

***3** times the area results in*

***3** times the mulling per minute!*

The necessarily slow-moving mulling wheels of the latest style conventional mixer cover a mulling area of 78,000 square inches per minute. Since mulling pressure (and therefore the mulling work) can only be applied over the area contacted, this area absolutely limits the amount of mulling that may be done. In the Speedmullor, light-weight mulling elements permit high speeds. The mulling wheels are horizontally mounted, so that the greatest mulling path area is utilized. The three high-speed mulling wheels of a Model "80" Speedmullor cover 210,000 square inches each minute.

...g with the SPEEDMULLOR!



Centrifugal force is utilized by horizontally-mounted, light-weight, high-speed mulling wheels. Spring-loading, another mulling principle which was originated by Beardsley & Piper in 1944 (although an excellent method for portable mixers such as the Mulbaro), is not nearly as efficient as the high-speed centrifugal method used in the stationary Speedmullor.

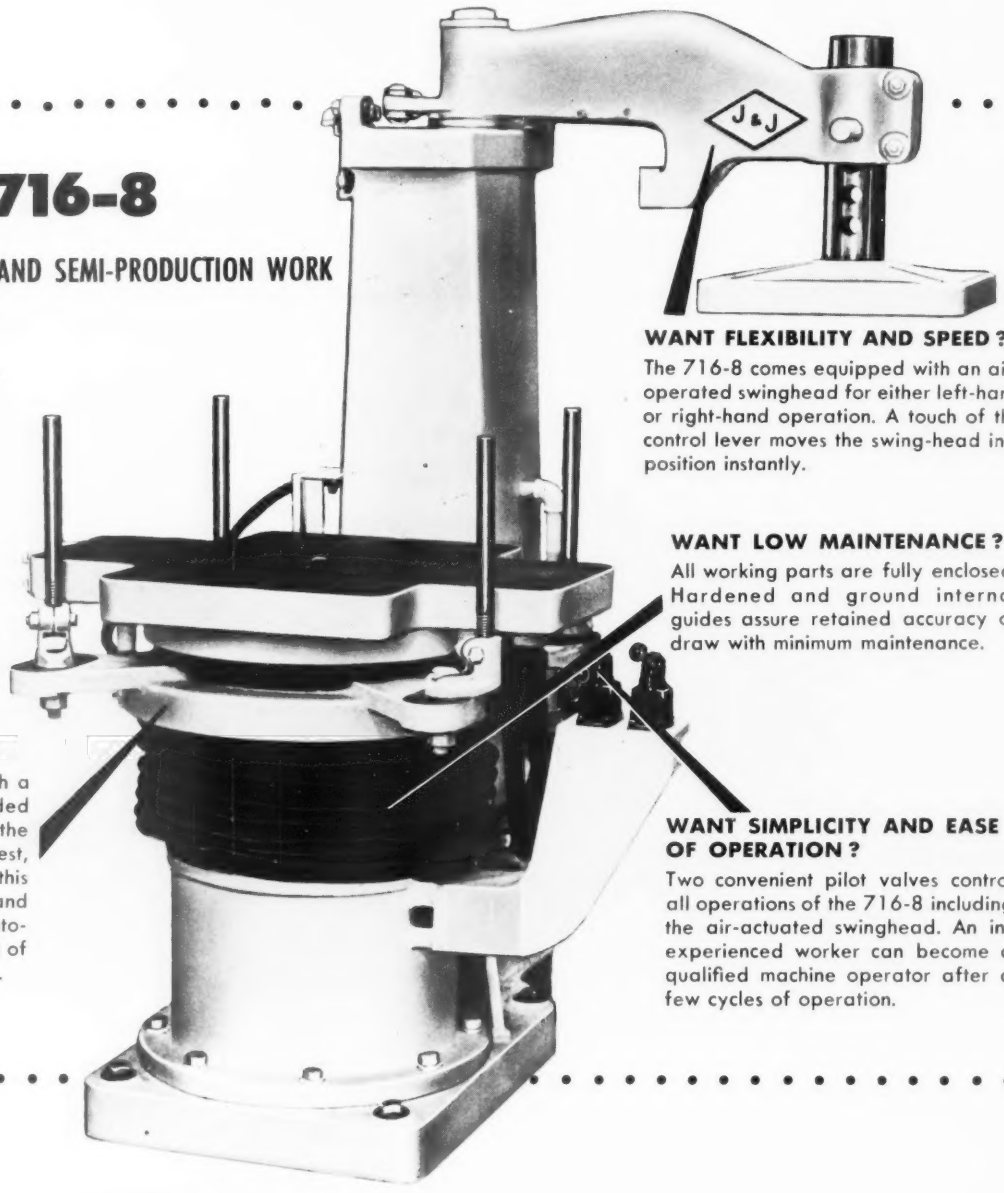
The sand is mulled in suspension between rubber-tired wheel and rubber liner. Intense aeration *during mulling* eliminates any need for expensive external aerators.

The only completely NEW JOLT SQUEEZE PIN-LIFT!

the J&J 716-8

FOR MEDIUM SIZE PRODUCTION AND SEMI-PRODUCTION WORK

Table Size	24″ x 34″
Jolt Cyl. Diam.	7″
Squeeze Cyl. Diam.	16″
Pattern Draw	8″



WANT FLEXIBILITY AND SPEED?
The 716-8 comes equipped with an air-operated swinghead for either left-hand or right-hand operation. A touch of the control lever moves the swing-head into position instantly.

WANT LOW MAINTENANCE?
All working parts are fully enclosed. Hardened and ground internal guides assure retained accuracy of draw with minimum maintenance.

WANT AN ACCURATE DRAW?
Exclusive concentric draw design with a single concentric draw cylinder guided by a full diameter bearing area of the squeeze cylinder assures the smoothest, most accurate draw available with this type machine. There is positive slow and fast draw on the same stroke with automatic vibrator control, and the length of slow draw is automatically controlled.

WANT SIMPLICITY AND EASE OF OPERATION?
Two convenient pilot valves control all operations of the 716-8 including the air-actuated swinghead. An inexperienced worker can become a qualified machine operator after a few cycles of operation.

write today for complete information

JOHNSTON J&J JENNINGS

AN IMPROVED LINE!

- Jolt Rollover Pattern-Draw
- Jolt Stripper or Pin-Lift
- Jolt Squeeze
- Jolt Squeeze Pin-Lift
- Plain Air-Jolt

MOLDING MACHINE DIVISION
THE JOHNSTON & JENNINGS COMPANY
Division of Pettibone Mulliken Corp.
2424 North Cicero Ave., Chicago 39, Illinois

(*Continued from page* 182)

figuring the economics of operation.

Having decided which carbon raiser to use, a trial run should be made for a day or two. Chemical analyses should be made at close intervals and compared to previous results. Lacking these, a less informative method is to look at fracture specimens. Some melters recommend double additions on sand bottom before the coke bed is put in. In some instances this has led to poor tapping because of blocked tap holes.

In one particular operation no carbon additions are made until after the sixth charge, because carbon was too high on first iron melted, resulting in poor finish on castings. Also, the amount of carbon raising materials on the last eight charges should be double to hold total carbon analyses uniform.

Hot blast cupola operations help total carbons because of higher temperatures obtained. Front slagging tends to more uniform total carbons.

High sulphur and high phosphorous irons tend to be lower in total carbons. Use of very rusty and burnt iron, such as stoker bars, grate bars and worn stove parts, should be avoided when trying for higher total carbons.

Good Fluxing Practice

To obtain high total carbon good fluxing is essential for a more rapid disposal of coke ash, a condition which may become bad and hinder carbon absorption. For very heavy or stiff slags, fluorspar type fluxes may be a help. In all cases good cupola operation remains essential, carbon additions add to the total carbon, but do not help to deoxidize the metal melted.

Type of carbon addition to molten iron has no effect upon type of carbon formed in iron melted. Ladle additions of granular graphite will tend to regulate the type or size of the graphite flake formed. This also is a function of the cooling rate of the casting poured.

Best time to add carbon raisers is just preceding the addition of coke splits. The coke provides a cushion against the impact resulting from charging the heavier materials.

Next to carbon, silicon is the most important addition to cast irons. Silicon is necessary for graphitization, controlling chill depth and grain size. Low silicon iron tends to be white at the fracture. About 3 points (0.03 per cent) of silicon are equivalent to 1 point of total carbon in gray iron.

The question of whether to melt high carbon and low silicon iron or low carbon and high silicon iron

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Like these comfortable respirators, all Willson safety equipment is made after careful study of industry's needs. Through this continuing research you get many comfort and safety improvements first in Willson products. Ask for Willson—largest line of respirators for industry, farm and home use.
Universal Gas Mask Style WUG
Approved by U. S. Bureau of Mines for toxic smokes and gases, including carbon monoxide.
Chemical Cartridge Respirator No. 831
Protects against common industrial gases and vapors in low concentration. New molded rubber facepiece with flexible rolled edge for extra comfort. Bureau of Mines Approval No. 2302.
No. 880 for metal fumes, mists and dusts
Same facepiece as No. 831, with replaceable dust filters. Comfortable under welding helmet. Bureau of Mines Approval No. 2149.

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may be judged partly on the economics of these materials, if both types of mixtures tend to give the same physicals. Too high a carbon or excessive amounts of silicon tend to give a molten metal of poor fluidity.

Silicon in most grades of good scrap will average about 1.80 to 2.00 per cent. Remelt losses on silicon vary from 5 to 12 per cent. Additions must be made to compensate for this loss.

Silvery pig, lump ferrosilicon or silicon briquets may be added to the cupola charge. Some prefer to melt low in silicon and make ladle additions of 70 per cent or higher grade silicon alloy to obtain the desired results. This type of addition calls for closer control. Additions of 70 per cent ferrosilicon are exothermic and will increase the temperature of the iron being poured. The right grade or type of silicon alloy to be added to the cupola depends upon the cost comparison of the brands available. Use of the higher content silicons, 60-90 per cent silicon metal, as a cupola addition is not especially recommended because of the possibility of non-uniform handling and melting of a more concentrated material. Silicon carbide materials add silicon to iron, although the primary use of these is to deoxidize the molten metal.

Manganese usually is present in sufficient amounts in purchased scrap. There is considerable loss in remelting this element because of its affinity for sulphur. Additions can be made easily to get the desired analysis.

Phosphorus is accumulative, since there is no loss of this element when melting in an acid lined cupola. Proper selection of scrap is best in controlling phosphorus. Amount present has an influence on the carbon equivalent of the iron. High phosphorus irons are more fluid, but have less strength. Also such irons tend to form slag adhesions or caking on ladle linings.

Sulphur is another element which accumulates from remelting scrap. Its presence has a noticeable effect upon the matrix of the graphite flake. Boyles[8] also shows how the mechanism of freezing in the iron is affected by higher sulphur irons. Higher sulphur irons have less fluidity. Fortunately, molten metal can be desulphurized in the ladle to overcome these difficulties.

Need Good Control

Combined carbon in the shop remelt and purchased scrap may accumulate from heat to heat and become troublesome. This can be controlled somewhat by careful melting, judicious use of coke between charges, and avoiding overblasting or oxidation conditions. Fluid slags, of high calcium content, and use of the silicon-carbide type of deoxidizers will help reduce amounts of combined carbon.

High combined carbon tends toward a finer grained, hard metal, which breaks easily and does not weld readily.

Assuming that we have our correct chemical analyses calculated, a constant watch of the physical properties must be made. Lacking a well equipped physical testing department, chill test and fracture inspections must be made frequently.

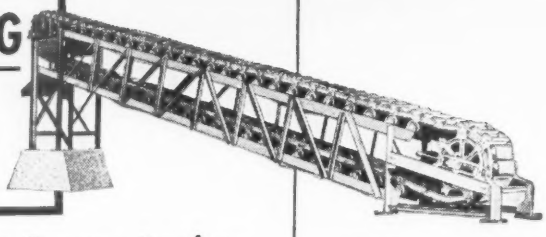
The more scrap charged, the greater the need for a thorough mixing of the molten metal. Unless considerable metal is held in a deep welled cupola, provisions must be made to increase the capacity of the mixing ladle.

Increasing the amount of scrap in the charge may make it necessary to increase the size of the charge to facilitate the weighing and charging operations, care being taken to control the size of pieces so that any

(*Concluded on page* 190)

Bailey

PIG CASTING MACHINE



For Ferrous and Non-Ferrous Smelters and Foundries

Ruggedly constructed for low-cost service, this machine is completely self-contained. If necessary it can be moved by crane and erected wherever needed. Once it is set in place, only an electrical connection is necessary for operation. The complete unit consists of the machine proper, motor, gear unit, variable speed reducer and drive.

CAPACITIES: 3 tons per hour to 50 tons per hour. 15 ft. to 100 ft. in multiples of 5 ft.

STATIONARY WHEEL

for Longer Service— Greater Economy

Bailey Stationary Wheel design eliminates 80% of the moving parts of the conventional type. The moulds are supported by endless chains that run on top of idler wheels which are mounted at stationary positions along the strand.

WILLIAM M. Bailey COMPANY

ENGINEERS

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(*Concluded from page* 188)

one piece will not cover more than 20 per cent of the cupola area. This will eliminate blocking and slow melting.

Do not try to increase that scrap charge too fast. Start increasing at about 5 per cent of the total charge weight each day and check casting results before making further charges. Watch your chemical analyses too.

Opinions expressed herein are those of the author and do not necessarily express the views of the American-Standard Corp.

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8. *Structure of Cast Iron*, Alfred Boyles, 1947 Edition, page 26.

new... for shell molding

PYROBOND adhesive BONDS Shell Mold Halves... gives you these important advantages

1. Tighter, more uniform closure of mold halves; eliminates need for bolts and clamps.
2. Seals closely and securely around mold cavities.
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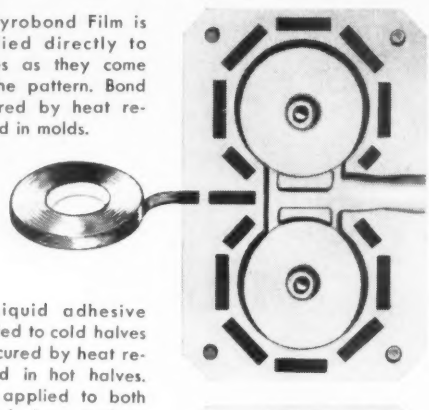
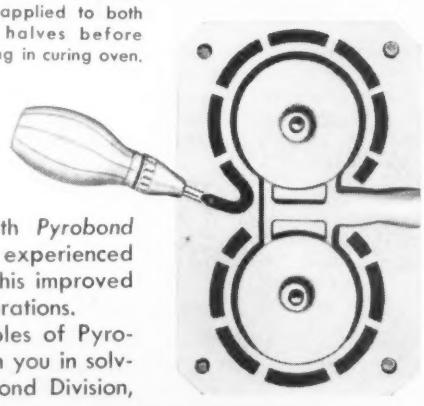
TWO methods of bonding molds with PYROBOND adhesive

1. Pyrobond Film is applied directly to halves as they come off the pattern. Bond is cured by heat retained in molds.



2. Liquid adhesive applied to cold halves and cured by heat retained in hot halves. Also applied to both cold halves before placing in curing oven.



The superior results obtained with *Pyrobond Adhesive* have been proved by experienced shell molders who are now using this improved sealing procedure in their own operations.

Write for full details and samples of Pyrobond Adhesives. We will work with you in solving your problem. Write to Pyrobond Division,

WB WORLD BESTOS
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Alloy Casting Institute Holds Annual Meeting

The Alloy Casting Institute met in Hot Springs, Va., recently at its twelfth annual convention to hear reports of the progress being made in the field of high-alloy castings materials and techniques and to elect officers.

Members of the group, a technical association of high-alloy foundries, heard reports on research at Ohio State University on the evaluation of titanium as a substitute for columbium in the cast stainless steel alloys, on research at Battelle Memorial Institute on high-temperature work and on research at Massachusetts Institute of Technology on the improvement of surfaces on high alloy castings.

Harvey T. Harrison, executive vice president, Duraloy Co., Scottdale, Pa., was re-elected president, and G. A. Baker vice president, Duriron Co., Dayton, O., was elected vice president. C. M. Carmichael, vice president, Stainless Steel & Alloys Division, Shawinigan Chemicals Ltd., Montreal, and M. N. Ornitz, vice president, National Alloy Steel Division, Blaw-Knox Co., Pittsburgh were elected new directors for terms ending in 1954. E. A. Schoefer, executive secretary of the institute, was re-elected.

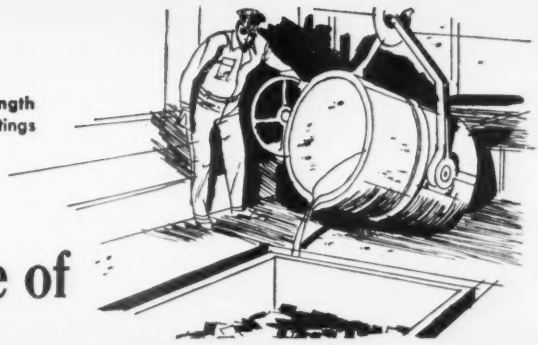
G. A. BAKER

H. T. HARRISON

Chairman of the Technical Research Committee is now N. A. Matthews of the metallurgical laboratories of American Brake Shoe Co., Mahwah, N. J. Chairman of the Shop Practices Committee is R. O'Connor, Cooper Alloy Foundry Co., Hillside, N. J.

Air Pollution Group Shortens Name

The Air Pollution and Smoke Prevention Association of America Inc. has changed its name to Air Pollution Control Association. The change was proposed at the 1952 annual meeting in Cleveland because the former name was so long as to be unwieldy.



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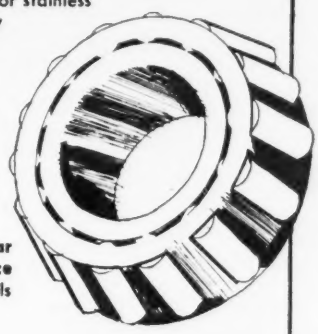
for iron foundry castings

Here is a wide range of

CHROMIUM ALLOYS

to meet your steel and iron requirements

Greater Corrosion Resistance for stainless truck body



Greater Wear Resistance for bearing steels

Alloy	Cr	Si	C	Application
Low Carbon Ferro Chromium	67/72%	1.00% max.	.03/2.00% max.	For production of stainless & other low carbon chromium steels as final chromium addition.
Low Carbon Ferro Chromium	58/60%	6.00/11.00%	.03–.06–.10% max.	For large chromium additions to stainless where rate of solution and moderate silicon addition are desirable to aid chromium recovery from slag.
Low Carbon Ferro Chromium Silicon	38/42%	40/45%	.03&.05%max.	Serves dual purpose of adding chromium to stainless steel and recovering oxidized chromium from slag.
Medium Carbon Ferro Chromium Silicon	48/52%	25/30%	1.25 max.	For adding both chromium and silicon to low alloy steels; ease of solution permits ladle or furnace additions.
High Carbon Ferro Chromium	66/70%	2.00% max.	4/6%	Standard alloy for moderate chromium additions to medium and high carbon steels and irons.
Iron Foundry Ferro Chromium	62/66%	6/9%	4/6%	A more readily soluble alloy for moderate chromium additions to cast iron.
Ferro Chromium Briquettes	Hexagonal. Weigh approx., 3⅜ lb. contain 2 lb. of chromium			Practical and convenient form of adding ferro chrome to cupola.
V-5 Foundry Alloy	38/42%	17/19%	8/11% Mn	A high carbon alloy for chromium addition; reduces chill, increases strength and hardness of cast iron.

Also other special Ferro Chromium and Ferro Chromium Silicon Alloys to meet your needs.

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- Cuts oven time by at least 25%; in many cases more.
- Boosts core production 25% with no costly capital outlays.
- Bakes thick chunks through rapidly, without developing cracks.
- Develops exceptional strength. You need 20% to 30% less oil.
- Extra strength provides an extra margin of safety at leaner ratios.
- Thick and thin core sections bake out safely side by side.
- High fluidity for easy mulling and excellent workability.
- Low cost: approximately $1. per gal. And . . . you need 20% to 30% less.
- Simple to use (Just pull the cores 25% sooner). Fool-proof performance.
- Made by Werner G. Smith . . . your assurance of uniform quality.

A trial drum will be sent on approval. Ask us about it.

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Investment Casting

This report released by the U. S. Department of Commerce discusses the history and present status of the investment precision casting or lost wax process. The report will be presented and discussed at a meeting of the government Precision Casting Committee to be held in October, 1952. Additional copies may be obtained from the Office of Technical Services, Department of Commerce, Washington, for 25 cents. The Office of Technical Services has indicated it would welcome comments or suggestions for incorporation in subsequent revisions.

By ROY W. TINDULA
Chief, Metals and Minerals Section
Office of Technical Services
U. S. Department of Commerce
Washington

PRECISION casting, investment-mold casting, and lost-wax (cire perdu) mold casting are different ways of describing a method of producing castings which dates back to early Egypt and later to China (Shang Dynasty 1766 - 1122 BC). About 400 years ago in Italy, Cellini, an artificer in bronze, utilized the lost wax (cire perdu) method of preparing patterns to make beautiful statues. Jewelers and dentists have been using this method of making castings for years. Early recognition for rediscovery of the method as used for fillings and inlays is attributed to B. F. Philbrook, in 1897, and to W. H. Taggart, in 1907[1]. Development of lost-wax methods for casting cobalt-alloy buckets for the gas turbine ends of airplane superchargers greatly spurred interest in the process during the early years of World War II[15, 47].

According to *Webster's International Dictionary*, "cire perdue" are two French words, which literally translated mean "lost or waste wax." The dictionary states further, "Designating or pertaining to a process of casting bronze statues, etc., which consists in constructing a model with a wax surface of suitable thickness, forming the outside mold about this, heating so that the wax runs out, and filling the vacant space with metal."

This lost wax process is known in some circles as investment molding and differs from ordinary molding in that the pattern or model is invested (enveloped) by the mold material and that the mold thus formed is not opened up to remove the pattern or model.

Investment Casting—The technical process of investment casting consists of the following basic steps:

(a) From a master metal pattern, prepare split soft metal dies.

(b) Mold in these dies a pattern of wax or plastic material for each individual part.

(c) Assemble several patterns with sprues and gates attached by welding wax pieces together.

(d) Invest a liquid refractory and bond mixture about the wax and allow to set.

(e) Heat the mold in an inverted position to first melt most of the wax and then vaporize the remnant at higher temperatures.

(f) Cast molten metal into the hot refractory mold employing gravity, pressure, vacuum or centrifugal methods to fill the mold cavity.

(g) Remove castings by breaking up the refractory mold after it has cooled. Cut off gates and sprues and clean the casting surface by sandblasting if necessary.

All steps of this process except the first must be repeated for each piece since the wax pattern and investment molds are destroyed in the process of making the metal casting.

Uses of Investment Casting—Castings of small, intricate parts may be produced by this method in nonferrous metals, cast iron and steel to finished shapes with smooth surfaces and high dimensional accuracy. Because the process does not require assembly of two refractory mold halves along a parting line, it is not subject to dimensional errors produced in removing metal fins or from core or mold shifts along this line as may be encountered in conventional sand casting methods.

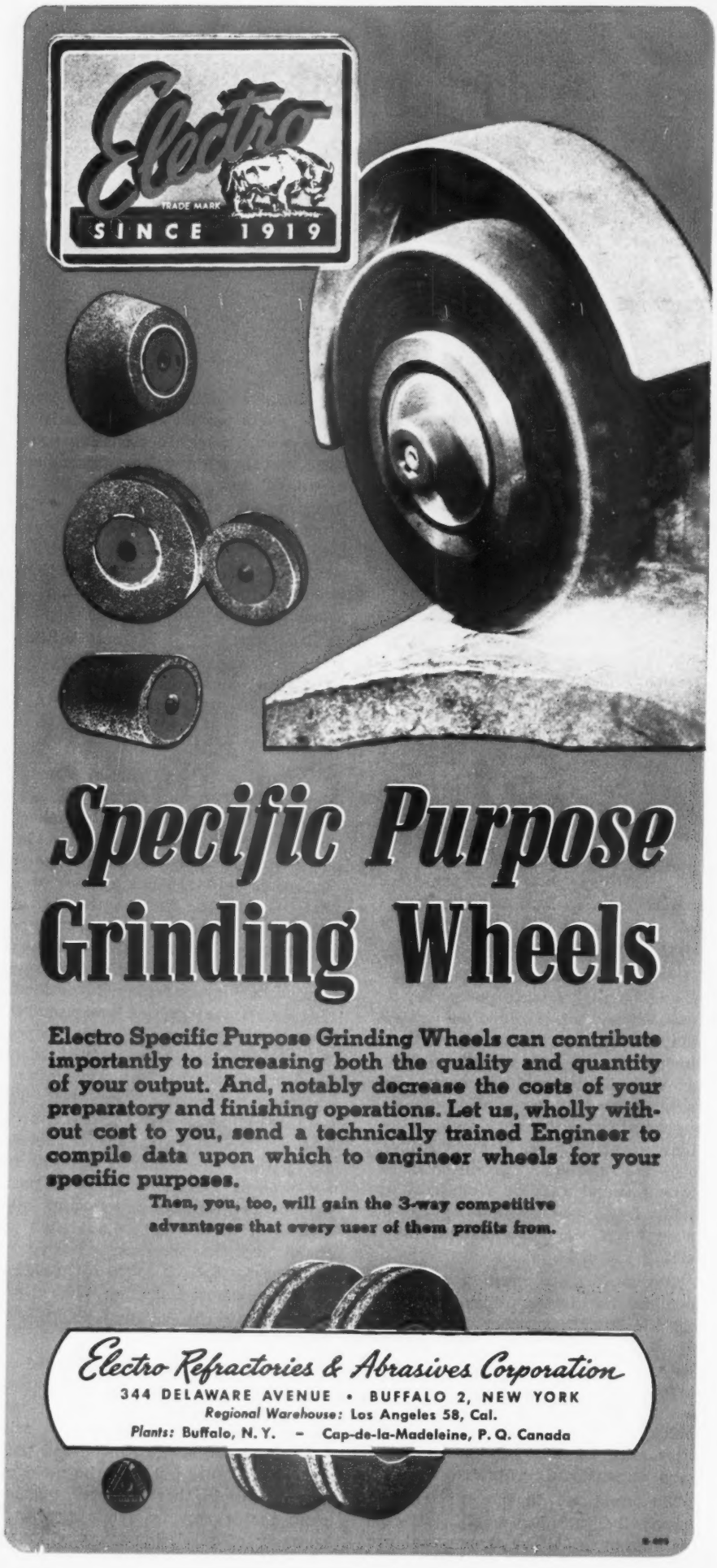
However, other casting methods such as the lost-mercury process[71] and the shell molding process[72] also may be employed in making ferrous castings of high precision. For nonferrous metals these methods, as well as plaster casting[73] (with split molds) and metal die-casting processes, also produce smooth parts of good dimensional control.

The field of investment casting principally includes small, intricate castings in metals or shapes that are too abrasive or too costly to machine. These parts cannot be made sufficiently accurate by other casting processes, but do not require a dimensional control beyond that obtainable by investment casting methods. The process is used where the combined cost of tooling, casting, and machining a part is lower than those obtainable by other casting, molding, or machining methods[70].

"Lost-mercury" or Mercast[71] methods of casting also employ refractory investment molds. The pattern material of this process, however, differs from that of the other lost-wax method.

Preparation of Soft-metal Pattern Dies—A master pattern first is produced to the desired final dimensions, except that corrections must be incorporated to allow for shrinkage in casting soft-metal working dies, wax patterns, and the final metal part as well as for expansion in drying and heating the investment refractory material. An example in which brass is cast in a plaster-silica investment of a particular type of wax requires that master patterns be made 1.5 per cent oversize[1]. A machined steel master pattern that has been chromium-plated for maximum wear resistance is preferred for extremely long production runs. Softer metals are suitable for shorter runs. In some cases a sample finished part may be used directly as a master pattern if it is not too complicated in shape and the precision required is not close. Costs of $1000 for making master patterns are, on the other hand, not at all unusual when production runs are to be long.[69].

The master pattern is employed to make molds for quantity production of wax patterns. Molds or dies may be made of any material that will hold its shape while the melted pattern material is put into the mold or die and cools there. These permanent molds can be made very accurately of steel, bronze, aluminum,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solders, hardened plasters, thermosetting plastics (including hard rubber) and, for some unusual cases, even vulcanized elastic rubber. Provisions are made in these molds, as far as practicable, to include the necessary gates, sprues, and risers in the pattern so that the pattern will be damaged as little as possible when the patterns are assembled to the header.

Soft-metal molds are made in halves with cast steel inserts that fit into holes into the opposite mold sides and thereby maintain accurate location and dimensions. The master pattern is half-embedded in plaster of Paris and the molten soft-metal cast against it to form each half of the mold. Low melting alloys, such as 50 per cent bismuth, 32.2 per cent lead, and 17.8 per cent tin, used for these molds are of balanced composition so that neither expansion nor contraction occurs on solidification[1]. Surface dimensions then agree with those of the master pattern to which they are cast. The molds are also made by hobbing soft-metal dies (bismuth alloy, Wood's metal, Cerrobend, Cerrobase, type metal, etc.) with the tool steel master pattern forced into the metal to the parting line[17]. Soft-metal molds are preferred for parts having contours or shapes which are difficult to generate or reproduce, as with turbine blades, etc., and are also used for parts without close tolerances[70]. Sometimes steel master dies are made for long runs and for parts which require the maximum in dimensional accuracy or have small cores, thin slots and intricate, involved shapes. For experimental work or short runs, vulcanized rubber molds often are used.

Rubber Mold Curing—Use of elastic rubber as a mold or die material is an interesting variation. The master pattern, with suitable gates and paths of metal flow attached, is enveloped in a suitable grade of unvulcanized rubber and placed in a suitably shaped container. The whole assembly then is placed in a vulcanizing autoclave, where the rubber is cured.

The cured rubber envelope on the master pattern is slit and peeled from the pattern. Great care is exercised to select a line for slitting the rubber envelope so that when it is put in the container in which it was vulcanized as a support, the rubber envelope will be correctly shaped. One must peel it off the pattern or model each time that it is used.

Molding Methods—Some molds (or dies for the making of patterns for investment casting use) can be used on die casting machines adapted to

(*Continued on page* 196)

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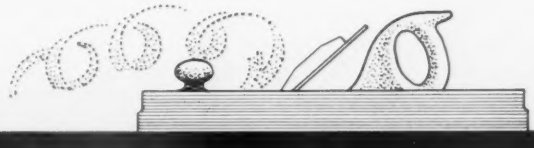

Cleveland STANDARD PATTERN WORKS, Inc.
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(*Continued from page* 194)

do injection molding of thermoplastic materials; other molds are so made that they may have the molten pattern material injected into the mold cavity under pressure or are adapted to having the molten pattern material poured into the mold cavity by gravity. Before use and between each use, molds are cleaned thoroughly and given any needed surface coating that will enable the pattern to leave the mold cleanly.

When the molten pattern material has cooled and solidified sufficiently to be handled, the patterns are removed from the dies or molds. These molds can have incorporated in them loose pieces that correspond to cores in ordinary foundry practice. These loose pieces must be so arranged that they can be handled mechanically if the die (or mold) is on a machine.

For maximum pattern accuracy[7], undercut surfaces must be located in the mold to permit their formation either by draw cores, removable prior to parting of the mold body, or by the various mold sub-sections.

Precision-formed hollow ceramic cores are used for long cored holes of small diameter. A complex mold must be suitable for easy dismantling and withdrawal of the pattern without damage or distortion. This requires care in location of cores, runners, and parting lines. The metal die is lubricated with light oil or special lubricants.

Pattern Making—Patterns or models for investment casting use today are produced from various thermoplastic materials that when treated soften and either flow away or evaporate and burn away, that do not swell before softening and thereby crack or break the mold, and that do not leave any residue in the mold when the mold is emptied by heat. The thermoplastic materials should be firm enough, at the temperatures encountered in the plant, to hold their shape.

Wax is kept a little above its melting point, then forced into the mold held at uniform temperature[1]. Commercial pattern waxes and machines are described in the references [2, 6, 17, and 51], and plastics patterns may also be used[43]. Various waxes such as ceresin, carnauba, beeswax, paraffin, acrawax, and rosin are blended with carbon black or polyethylene, depending on their strength, expansion, and cost. Polystyrene and other commercial plastics have advantages of greater strength and stability in handling. Frozen mercury or bismuth alloys may also be used for patterns. An excellent comparison of these materials was made by Valvi[6].

Pattern Assembly—After removal from the molds, the patterns or models are inspected for flaws, and those that pass are mounted on a header. The number of models or patterns that can be attached by sprue or directly to the header usually will be governed by the size of the patterns, the distance that must separate patterns in a mold, and the size of the flask that will be used. In some instances, the melting capacity will determine the number of patterns that are put into one flask.

Patterns, sprues, and gates are joined easily by a hot electric iron with a fine tip. Typical mounting of multiple patterns ready for investment are illustrated in [47, 5, and 36].

Investment—The assembled cluster is now ready for precoating and investment, the first step being to cover the surface with a material that will leave a smooth, clean surface and which will not fuse to a tough skin with the metal to be cast. For ferrous metals and those that melt at high temperatures, the first surface

(*Continued on page* 198)

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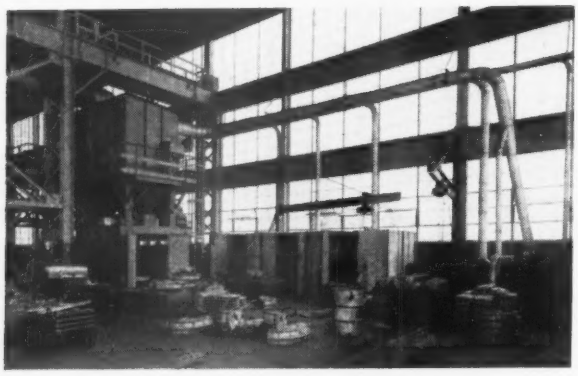

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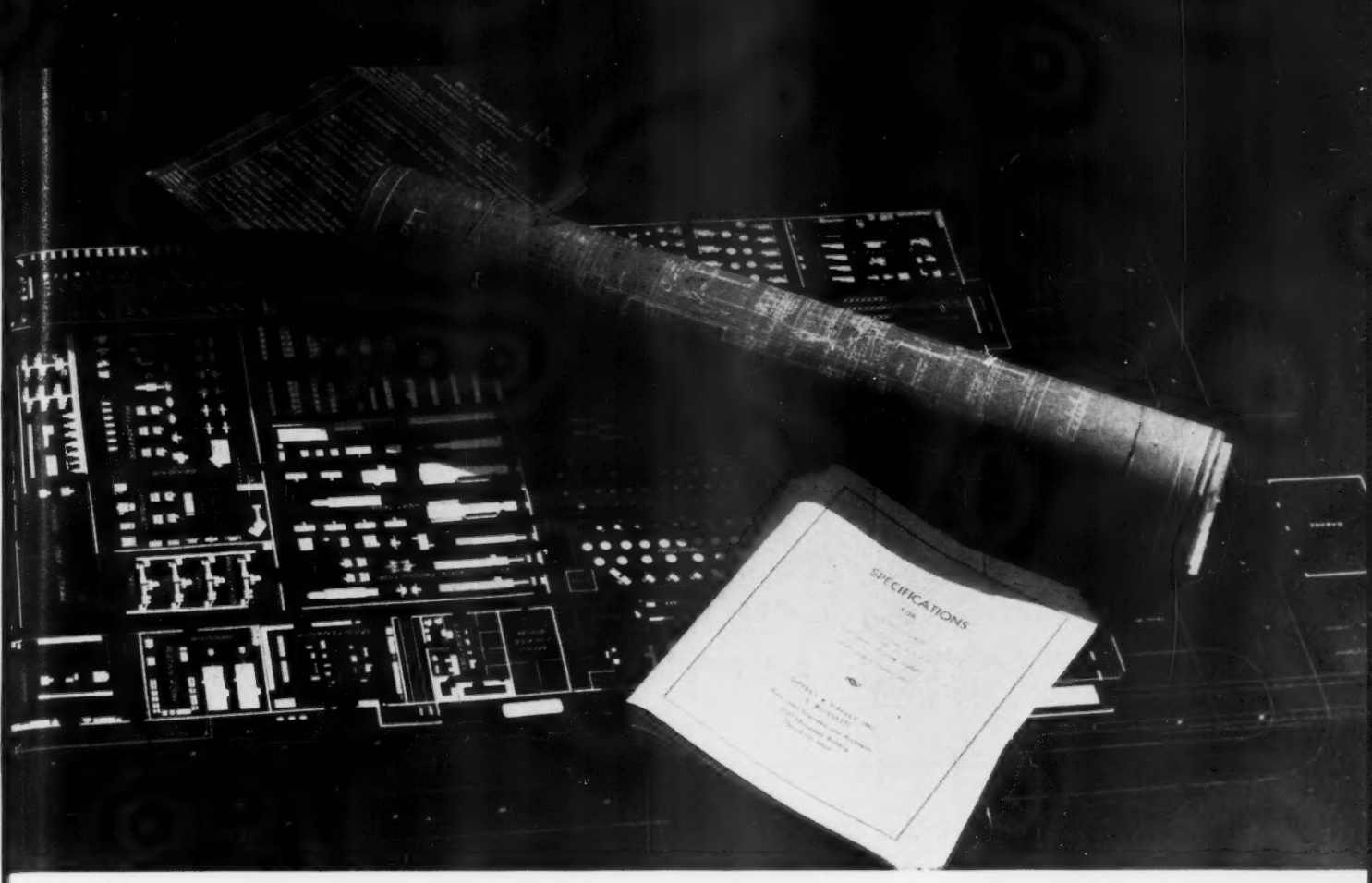

MONEY SAVING TOOLS

Layouts, drawings, specifications, bills of material. These documents, prepared by Giffels & Vallet, Inc., represent condensed experience gained in engineering foundry projects for more than twenty years. They are the plan of attack for building toward lower production costs. They are the tools used to acquire competitive prices on equipment, materials, and construction cost. They represent design in which the engineering has been integrated so that delays and costly field changes are eliminated. These tools are available to you for the development of your plans for new foundries or for expansion and modernization programs.

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(*Continued from page* 196)

treatment consists of a fine silica, suspended in a material that serves as a bond, which also controls expansion. When the dipped surface has dried, it is again dipped or sprayed, to cover any exposed surface. While tacky, the moist surface is covered with coarser silica, dropped onto the cluster from a sieve. The cluster is manipulated so that all surfaces are coated. The surface coating is dried by exposure to dry air at room temperature.

The dry-surface-treated cluster or pattern is now set in a flask (header down), and a paste-like mud composed of selected refractory material and a liquid additive are poured into the flask so as to cover completely the pattern cluster. The flask is vibrated to free any entrapped air and to aid the filling material to fill the mold completely. The operations of precoating and surrounding with a slurry are known as investment and give the name to the whole process.

For ferrous metals, silica, or zircon, grains of uniform size are mixed with ethyl silicate or sodium silicate to form a bond on firing to elevated temperatures[17, 19, 50]. For nonferrous metals, silica is bonded with plaster of Paris[5, 27, 28, 54].

Heating Investment and Wax — The mold material is allowed to set. After a predetermined time, the mold is warmed, to dry it, then heated in an oven to melt the model or pattern. The melted pattern material is allowed to run out and is collected for reuse. The mold is further heated in a furnace to volatilize or burn away any pattern material that has soaked into the mold or which has not run out of the cavity made by the pattern, to provide a hot mold that will not chill or freeze any incoming metal too rapidly, and, by expansion of the mold, to compensate for much of the shrinkage that will occur as the cast metal cools.

Steam plates and furnaces for melting and burning away wax when used for casting steel are illustrated in [4] and [47]. For an autoclave method for removing wax before casting aluminum alloys, see [5]. It is necessary that the rate of temperature rise be slow and uniform, especially around 1063° F, because the quartz refractory undergoes a crystal change with expansion in heating at this temperature. Other investments such as stabilized zirconium silicate, sillimanite, and chamotte, which do not show expansion points on heating, have been used in place of silica to avoid the tendency, especially of larger masses of silica investment, to crack on heating. However, silica is the cheapest and common refractory used for regular production work in the smaller sizes of castings generally made by the investment method. The melting and vaporization of wax form the cavity, later replaced by metal, and give the common name lost-wax to the process.

Melting Metal — Metals for the molds prepared as outlined can be melted by gas flame or by electric arc or induction furnaces. For examples and illustrations of these processes see [1, 6, 15, 17, 18, 21, and 48] for arc furnaces; [1 and 18] concerning induction furnaces; and [17] concerning gas-fired furnaces.

Casting Metal — The melted metal may be poured from a ladle or induction furnace into the castings by gravity alone, although either suction or centrifugal casting more often are used. Such methods are illustrated in [1, 2, and 17]. Small electric arc furnaces are frequently used for melting iron, nickel, or cobalt alloys in conjunction with pressure casting. The metal is melted and brought to the necessary temperature for pour-

(*Continued on page* 201)

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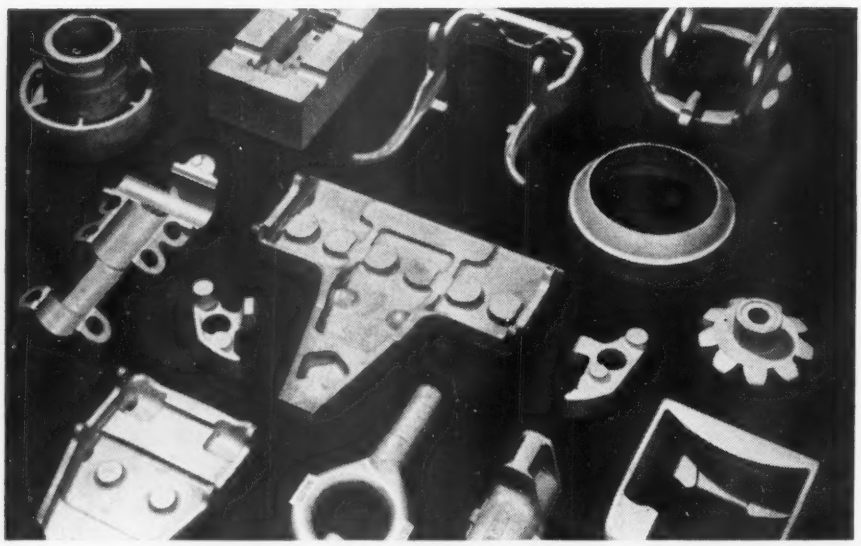

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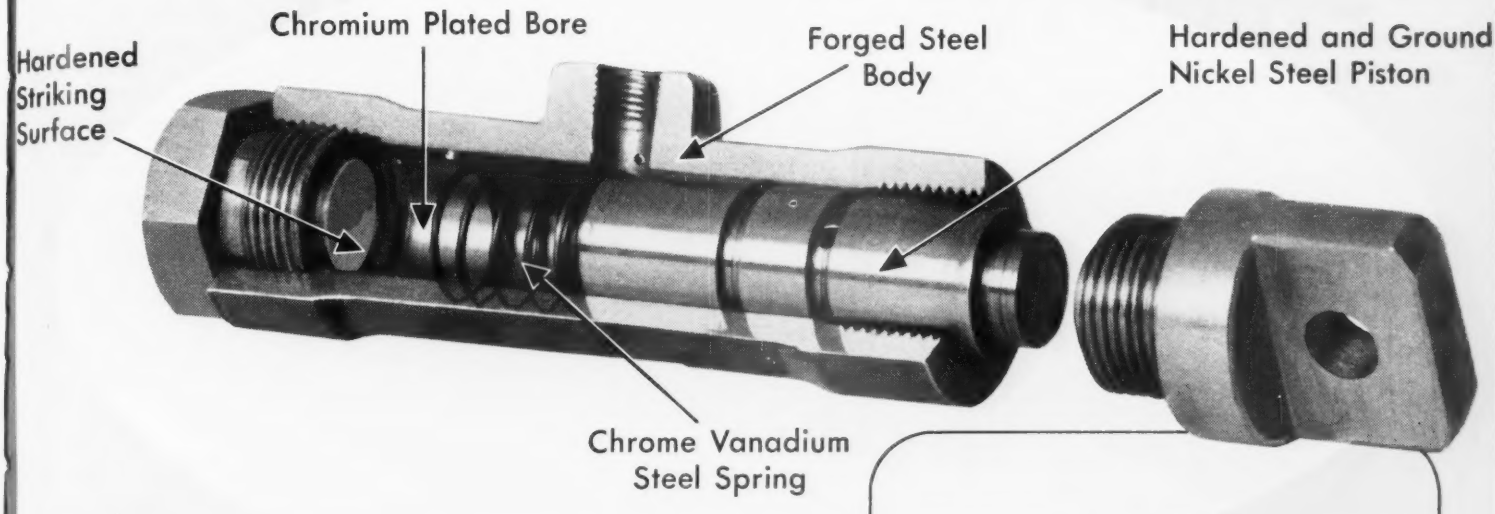

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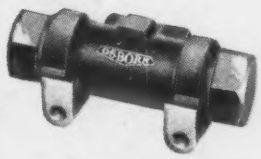

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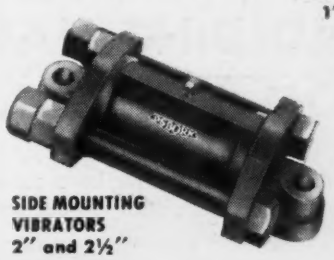

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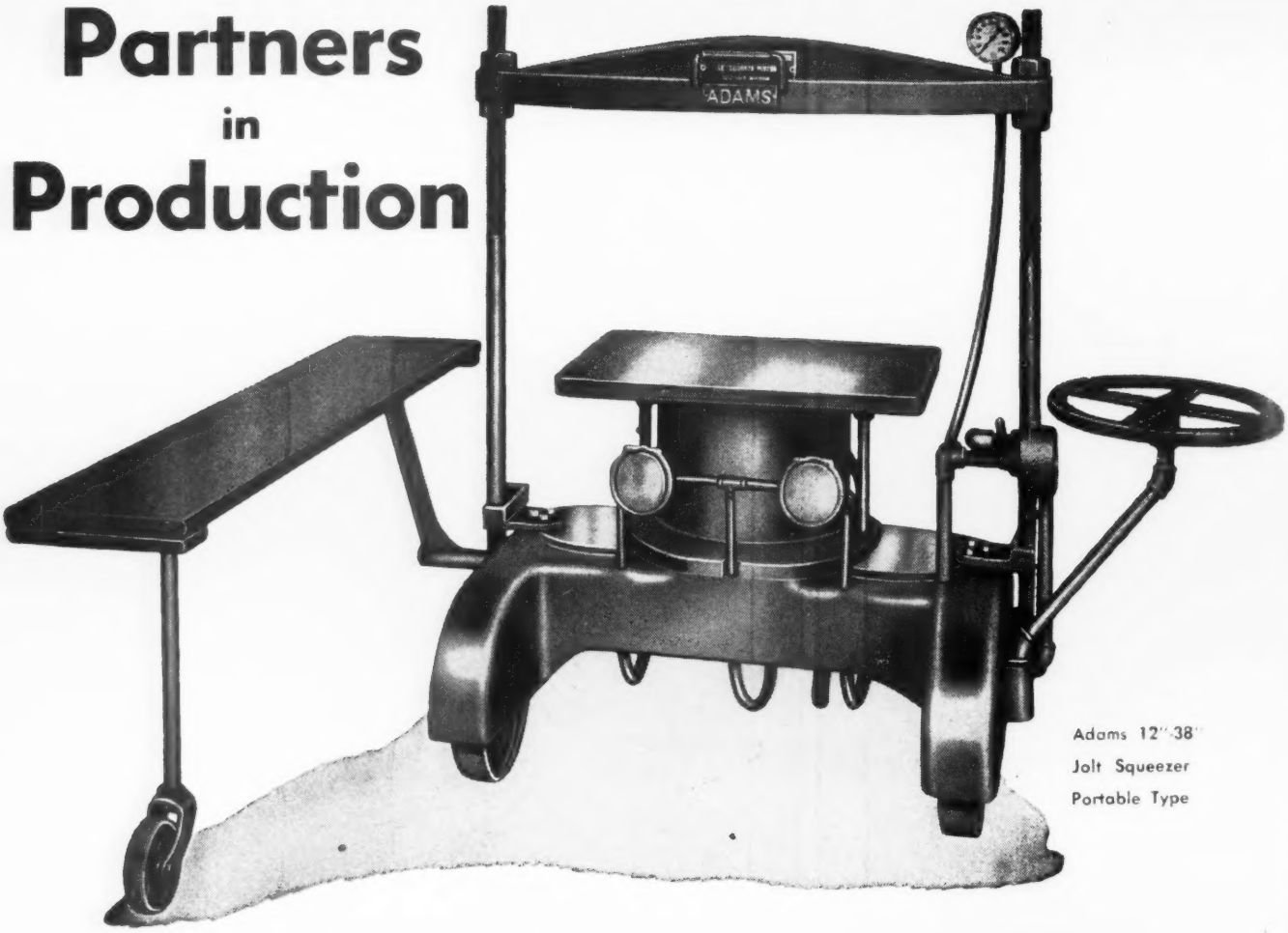

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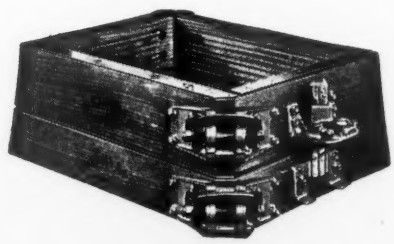

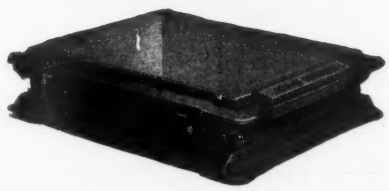

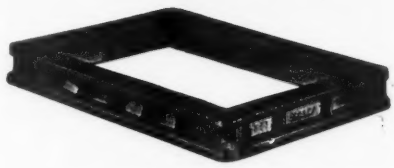

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MOLDING MACHINES and FLASK EQUIPMENT

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(*Continued from page* 198)

ing. This temperature is checked either by sighting an optical pyrometer at the hot brickwork of the furnace or by a platinum immersion thermocouple protected by a small expendable quartz tube. The preheated mold is removed quickly from the preheating furnace and then mounted and clamped on top of the arc furnace with the sprue end of the mold down and opposite the pouring spout of the furnace. With mold attached, the furnace is rotated on its trunnion mounting causing molten metal to flow into the mold. Air or inert gases under pressure are applied through the furnace to add an extra downward force to the gravity flow of metal into the mold[1, 2, 18, 30].

In centrifugal casting, metal is forced against the vertical outer walls of the mold as it spins about its axis. This has the same effect as a pressure head, but in a radial, vertical direction. Sometimes molten metal is sucked upward or poured downward into a mold from which all or most of the air has been evacuated by a pump. This process is known as "vacuum" or, more accurately, as "suction" casting.

Precision investment casting of parts with thin or knife-edged sections generally requires an additional force beyond gravity pouring to fill the mold completely. In the manufacture of parts with sharp edges the mold assembly, casting method, and direction of gating into the mold should be arranged so that the metal stream and pressure are directly toward these edges, in order to form them properly. The central riser of the mold also should have a greater section thickness than the heaviest section of the castings which it feeds and should be attached to it. These principles are also common to other casting processes, but are particularly important in precision casting since the surface must be true to dimension at all points. Grinding or machining to remove imperfections is seldom possible, and the metal must be free of shrinkage cavities, laps, and folds.

Precision of Process — When the pattern or model is produced very accurately and the behavior of the investment material has been determined carefully during an established cycle to produce a casting, it has been found that the resulting casting can be reproduced to very close limits. Very accurately reproduced castings have earned the name "precision casting," and the method is known by the same name.

Dimension tolerances *closer* than plus or minus .002-in. per lineal inch are difficult to maintain and often require finishing operations. Polishing or finish grinding is usually necessary for important contact points and bearing surfaces. Investment casting can not compete economically with well-tooled machining methods when very large quantities of parts are required. However, the process has been very useful for manufacturing intricate shapes, for small and medium quantities of parts that would not warrant more expensive tooling or that are needed in a greater hurry, and for alloys that can be forged or machined only at great expense and with difficulty[1, 3, 8, 20, 22].

Limitations—This modern adaptation of an old process of making castings presents many problems, all of which must be considered. For one thing it is not fast; hence time cost is an important cost factor.

For low temperature melting metals such as brass, etc., and for the noble metals, which are relatively inert chemically, the procedures have been established that produce satis-

(*Continued on page* 204)

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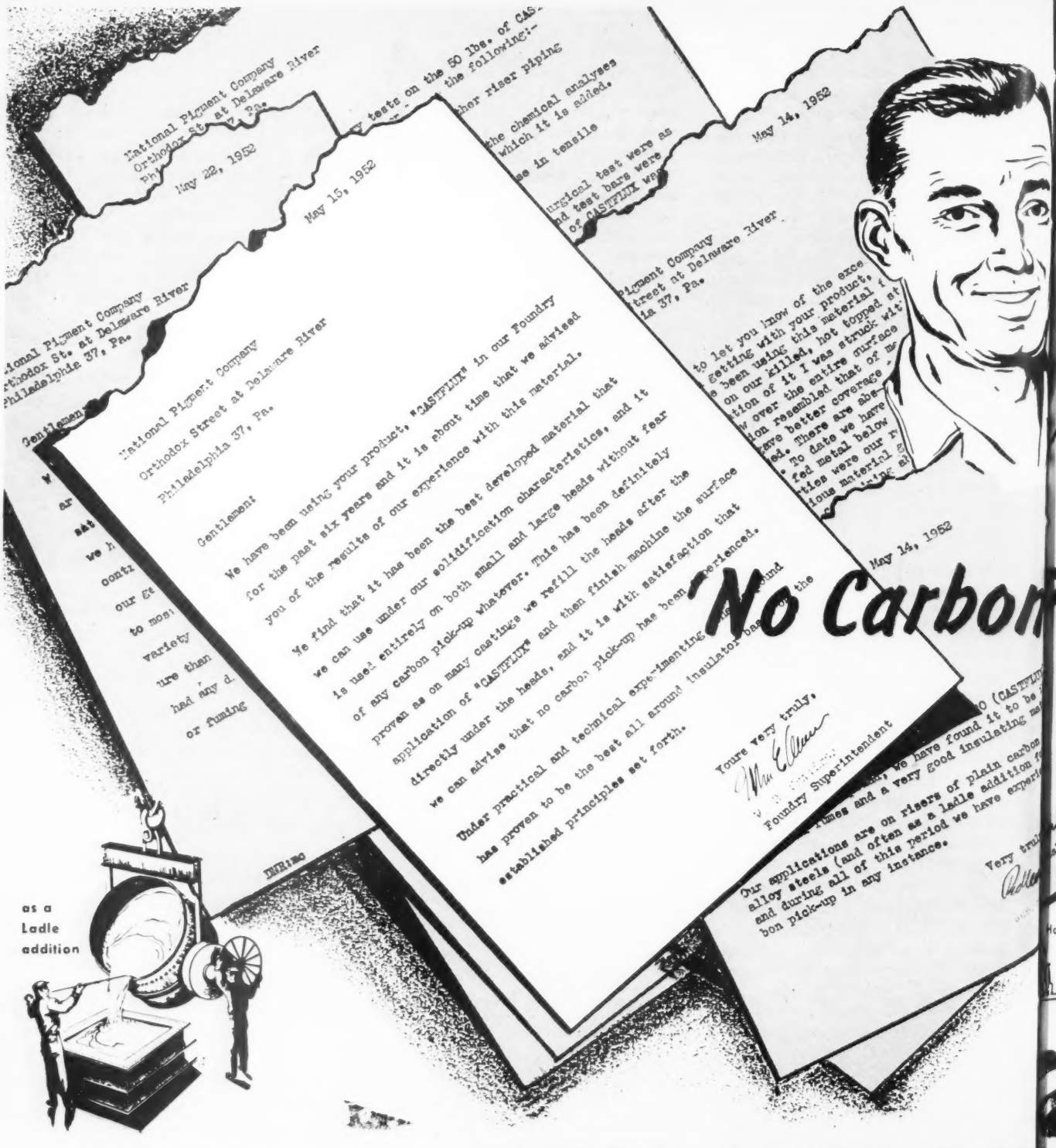
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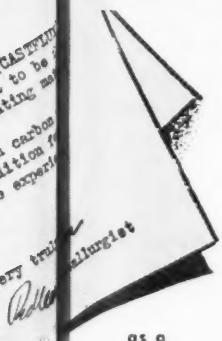
New, improved CASTFLUX SB-10 is a DUAL PURPOSE FLUX, a partly exothermic compound for feeding heads and risers that virtually DOES NOT SMOKE OR CREATE FUME. There is ABSOLUTELY NO CARBON PICK-UP at the neck of the riser or casting itself. It keeps the "pour" hot and liquid for periods of 100% to 200% longer. As a ladle addition it is a wonderful liquidizer—through its cleansing action it de-oxidizes and de-gasifies the metal. It has been universally accepted by the industry for its metallurgically controlled "batch-uniformity". That it increases the yield and improves production at considerable savings has been conclusively proven. You, too, can benefit by a test-trial!

...Pick-Up with CASTFLUX SB-10'



as a Hot Topping and on Risers

*Excerpts from actual letters on file

"...we refill the heads after the application of "CASTFLUX" and then finish machine the surface directly under the heads, and it is with satisfaction that we can advise that no carbon pick-up has been experienced..."

"...never had any difficulty with carbon pick-up or with smoke or fuming from the use of CASTFLUX in our foundry."

"...found CASTFLUX to be free of smoke and fumes and in more than six (6) years have experienced no carbon pick-up in any instance."

"...absolutely no fumes given off by the use of CASTFLUX. To date we have experienced no carbon pick-up in the fed metal below the sink head."

"...on the test made with CASTFLUX, a very definite increase in tensile strength of the metal was noted..."

...SB-FLUX

unconditionally **GUARANTEED**

"Unless CASTFLUX SB-10 meets with your full approval, material can be returned at no expense within 30 days.

CASTFLUX

Trade Mark Reg.

Send for free literature "The Story of CASTFLUX"

...CO ORTHODOX ST. AT DELAWARE RIVER, PHILA. 37, PA.

(*Continued from page* 201)

factory castings for the purpose intended (use of dentists and jewelers).

When the ferrous metals are handled, it is almost necessary that all such metals, and the molds for the metals, be produced under the control of competent metallurgists. In molten condition, the ferrous metals are very active chemically, for they readily oxidize, absorb gases, fuse with almost any material that they touch and are subject to possible exothermic reactions to certain types of mold materials.

Mold materials present many problems to the investment caster. In recent years, as some of these problems were solved by experimenters, patents have been granted to the discoverers of the mixtures of materials that produced better castings. Expansion properties of the refractory material and of the additives which serve to bond the mold influence the shape of the mold at the time that the metal is poured. The mold surfaces must not fuse with the casting surface.

The approximate limitations on size of precision investment castings now in commercial production have been reported as follows:

Weight range	0.0005 to 1.0 lb
Greatest length	8 in.
Thinnest section	
(for limited area)	0.020-in.
(over extensive area)	0.040-in.
Thinnest edge	
(on 20° angle)	0.015-in.

The methods, economic markets, and limitations of investment precision casting vary greatly with the *metal or alloy* being cast as well as with dimensions and quantity of the product being made[45].

High temperature alloys, including cobalt and nickel alloys and nickel-chromium stainless steels are comparatively easy to cast, but difficult to machine or produce by other methods. Investment casting is extensively used in making these alloys[15, 17, 21, 40, 47].

Make Steel Castings

Carbon and low alloy steels are made by this process largely to produce intricate parts for experimental or short production runs. The decarburization of the metal surface adjacent to the silica investment mold is a technical problem encountered that may be corrected by heat-treatment with carefully controlled furnace atmospheres[22, 35].

A listing of *nonferrous* alloys most commonly used for investment casting is as follows[44]:

Aluminum:	Types 43, B 195 good; 356 best.
Magnesium:	Dowmetal C best.
Brass:	Yellow, leaded type good; silicon and red types best.
Bronze:	Tin, aluminum, manganese good; beryllium best.

The investment-mold method of producing parts by casting to finished shape, though possible for many items, is not economically practicable for some. Its use is therefore limited, particularly as a means to produce precision castings in materials that cannot be machined and for precision castings of parts that would otherwise require a large amount of expensive machine work in producing the finished product.

Patents—Most of the firms that have obtained patents for processes or means to produce good castings by the investment-mold method will license users of their patents and/or will send supplies that are suited for the work intended. Melting equipment and casting and cleaning equipment suited to this class of work has

(*Continued on page* 207)

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Think what this means in terms of actual dollars and cents saved on otherwise lost production! Then, note this: the original cost of the PEKAY AIRATOR is *considerably less installed*—installation by your own personnel takes normally only about 25 man-hours! But that's not all: even when worn blades must finally be replaced, the job is usually done in *2 hours*—and without a cutting-torch!

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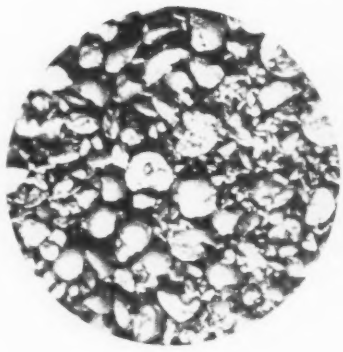
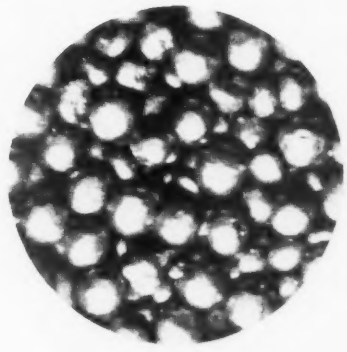
LIFE COMPARISON
TRUSTEEL vs. CHILLED IRON SHOT



CHILLED IRON
after 50 passes



TRUSTEEL
after 1500 passes

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(*Continued from page* 204)

been developed and is available to interested parties.

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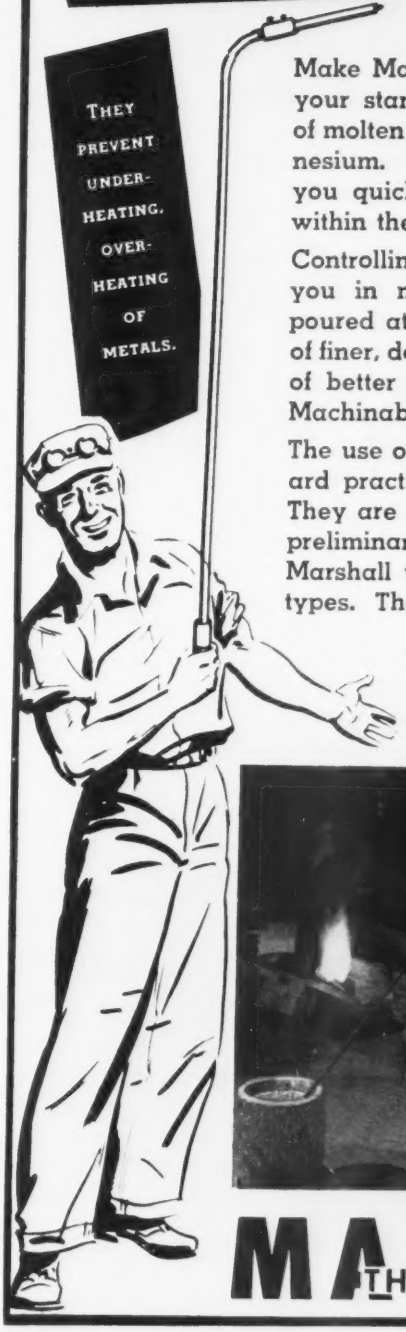
Quick Temperature Reports!



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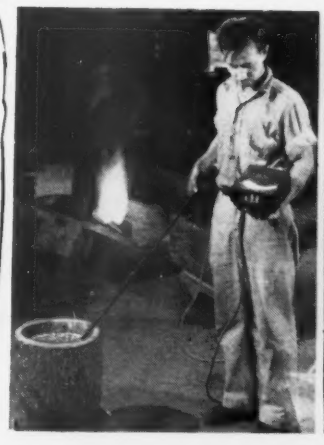

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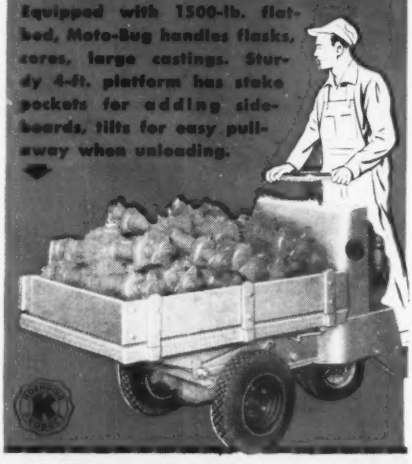

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IBF Convention Papers

(*Continued from page* 156)

litic graphite formation in the absence of other subversive elements, and he wondered what percentage of tin the author had found to have a harmful effect. Mr. Hughes replied that the effect of elements in opposing, hindering or modifying the production of spheritic graphite by magnesium is quite a vast subject. The composition of the base iron is an important factor. A very small number of base elements could to a very great extent affect the amount of tin before the structure was very much upset, but the effect of tin began at very low levels. In certain irons one could get quite an effect as low down as 0.01 of tin if the iron was pure, but in the presence of some of the other trace elements, there was no effect unless there was considerably more tin present.

Mr. Morrogh then referred to a statement by the author about non-inoculated magnesium - containing irons in which he had said that the carbon had apparently diffused to the spherulites in an irregular manner, giving an imperfect outline, and that the effect was greater than could be explained solely on the basis of the reduced number of nodules. Mr. Morrogh asked how he had arrived at the decision.

In reply, Mr. Hughes said that Mr. Morrogh had suggested that each spheroid had a region around it in which it could influence the liquid on solidifying as the iron graphite eutectic. This might be so, the author said, but from the few experiments he had helped to do on the noninoculated irons, and in the range of composition used, it did not seem to be the case. The decreased number of spheroids was so little that one could not attribute it to that effect. The number was probably reduced by not more than 10 per cent since there had

(*Concluded on page* 210)

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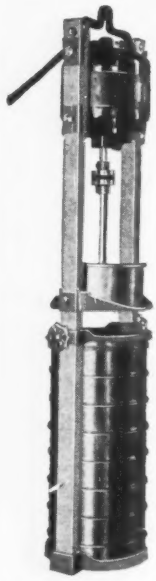

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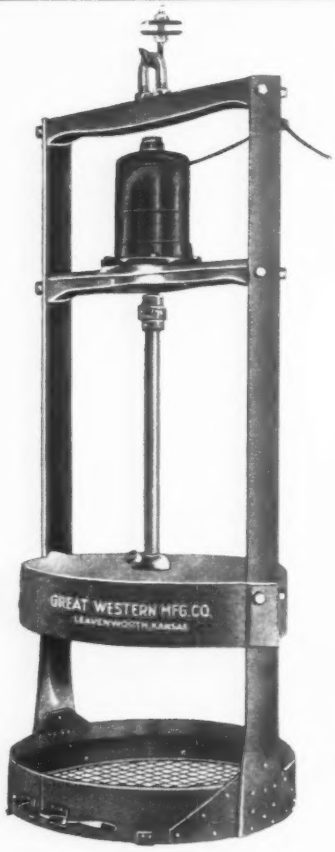

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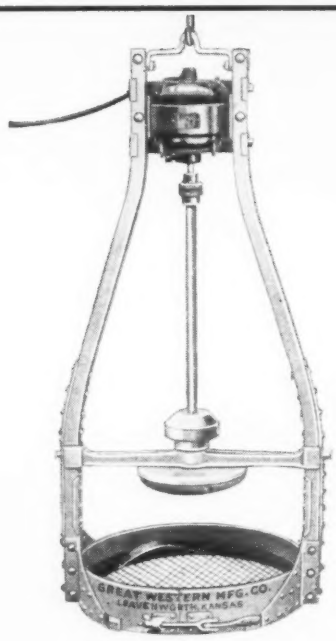

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(*Concluded from page* 208)

been about 1800 centers of crystallization in the inoculated iron as compared to 1650 to 1700 in the noninoculated conditon.

Mr. Hughes added that he did not believe that small decrease could itself be sufficient to give iron carbide around the outside because the spheroids were not large enough. Concerning the effect of the irregular precipitation, he speculated that perhaps if the spheroids were growing close to the austenitic dendrites and that division of the carbide was raised in some way in a noninoculated iron, one might find that it was passing more rapidly through that part of the metal going away from the austenitic dendrite than through it.

Mr. Morrogh asked about a statement in the paper that spheroidal graphite irons had a more dense appearance under a microscope than flake graphite irons. Mr. Hughes replied that he meant that when one observes a coarse graphite flake iron, which has a kind of structure generally called open, the graphite in the matrices appears to lack cohesion, particularly on machining and in polishing microstructures. He was suggesting that perhaps there are, in fact, small spaces between the flake graphite and the austenite, in some cases due to a lack of fit.

Spheroids in Irons

As the discussion continued, Mr. Morrogh discussed the formation of nodules, solidification sequences, and the effects of inoculation and quenching. Mr. Hughes said that he had found very small spheroids in all the quenched samples of all types of iron that had been investigated, but the number of these spheroids and the ease with which they might be found were merely reduced in the noninoculated irons. The fact that inoculation might reduce the number of graphite spheroids was in keeping with the idea that inoculation precipitated the graphite in the form of some kind of graphite particles. It was not unreasonable, he thought, that some of those particles might be spherulitic in form.

When Mr. Fleming referred to an American work in which it had been suggested that the type of graphite depended on alterations in the surface forces between the liquid iron and the graphite, Mr. Hughes replied that although the idea seemed to have possibilities and had been mentioned in connection with aluminum alloys, he did not think it had a bearing on the production of spheroidal graphite.

(*To be concluded in October*)

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The Allis-Chalmers Betatron is marketed, installed and serviced by Picker X-Ray Corporation. The far-flung sales and service network of this organization, the largest in the world devoted exclusively to x-ray, stands behind every machine. Somewhere on this map, there's a local Picker representative near you.

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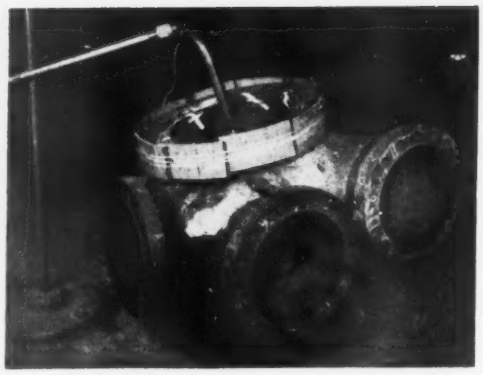
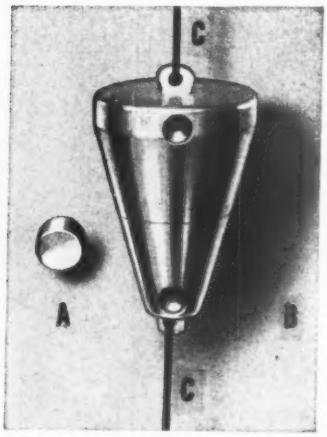
25 SO. BROADWAY • WHITE PLAINS, N. Y.

BUY . . . RENT . . . OR LEASE OUR RADIUM RADIOGRAPHY KIT



Radiographing a flange on a heavy steel casting.



The apparatus is as simple as
A—small radium capsule
B—cartridge container
C—rigid string support

. . A short cut to more productive and economical foundry practice

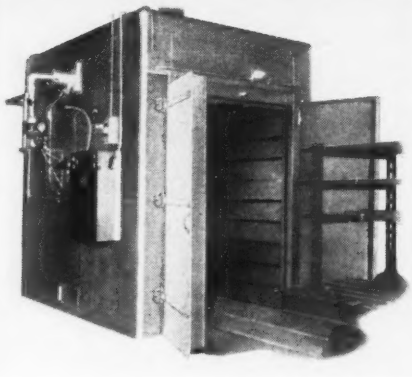
The use of gamma rays in radiographing steel castings has greatly increased since 1930, when the first commercial use of radiography was introduced. Radium radiography is simple, economical and effective; because it may be rented or leased, the equipment doesn't require a capital investment. It is simple to operate because it doesn't require especially skilled operators. Today radium radiography is rapidly approaching the status of standard equipment in progressive steel foundries. Let us tell you more about the simplicity and economy of radium radiography. Write today for prices, terms and case histories. Your requirements promptly supplied.

RADIUM CHEMICAL CO., INC.

161 East 42nd St., N. Y. Chicago: Marshall Field Annex Bldg. Los Angeles: 3723 Wilshire Blvd.

Avail YOURSELF OF THE "KNOW-HOW" OF MICHIGAN OVEN ENGINEERS

LET US SOLVE YOUR CORE-BAKING PROBLEMS



If you have a core-baking problem that baffles you, turn it over to us for solution. No matter how tough it may be, we are confident that our staff of oven designers, with their combined oven engineering experience of 150 years, will come up with the answer. Would you like our representative to call? No obligation.

Write for Brochure: "Your Oven Problems"

MICHIGAN OVEN COMPANY DETROIT MICHIGAN MOCO

Representatives In Principal Industrial Areas

MICHIGAN OVEN COMPANY

419 Brainard St. Detroit 1, Mich.

Fine-Hardware Foundry

(*Continued from page* 107)

of a staff member.

Consider the case of a drawer pull. From rough sketches (sometimes only memory) the design is first formed in sculptor's clay. From this a plaster cast is made. With the plaster cast as a mold, the design is next cast in hard wax, which in turn is used by a molder as a pattern for the careful ramming of a sand mold. A white metal casting is then made from the sand mold. Working with etcher's and engraver's tools, the designer works on the white metal piece to achieve a high degree of accuracy and perfection of detail. Finally, a brass gated pattern is made from the white metal original.

At this point, E. J. Lambrix, foundry superintendent, and his men take up the responsibility of accuracy. Fully-detailed production records are scrupulously maintained, especially with respect to metal make-up and other special quirks which experience has dictated are the best approaches to specific jobs. Every potential variable in the foundry must be minimized or eliminated. Dimensions must be perfect as cast, since the products are precision-assembled with no machining steps.

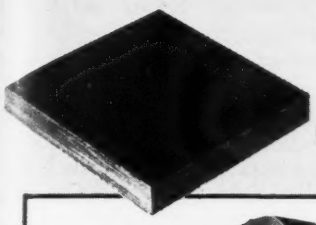
Use Four Pins

Molds are made via standard jar-squeezer machine operations with a gated pattern and Tamastone hard match. A tight flask is used with four pins instead of the conventional two. While such a setup is not in widespread use today, it serves admirably to provide what is required in the castings—accuracy, fidelity of detail and complete absence of fins.

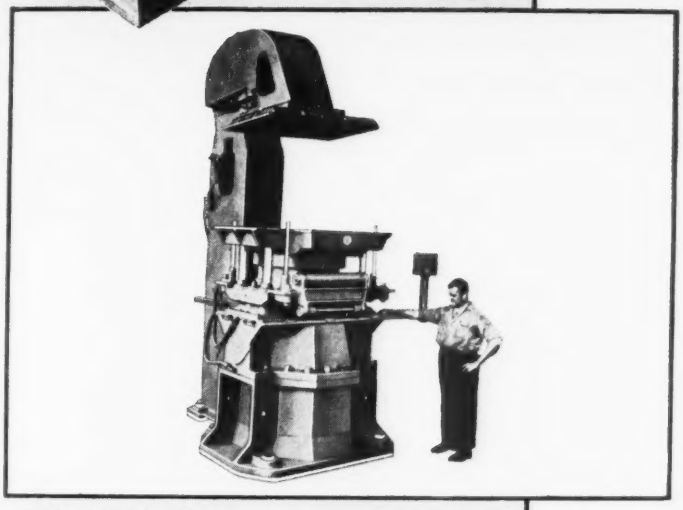
There are 14 molding stations arranged in two batteries of seven each along the side walls. Each station has a pouring turntable which flanks a wide center aisle. All pouring is done from this aisle by means of an overhead track conveyor from the melt room.

Machines are top-squeeze type jar-squeezers. In the interests of removing all possible sources of variation, Chautauqua and Tabor Mfg. Co. engineers collaborated in modifying standard Tabor machines to meet the company's specific production problems. Since substantially only one depth of flask is used, the column of the machine is shortened so that the squeeze head just clears the bottom board. The squeeze head has been redesigned from an adjustable to a fixed type. Renewable bushings are

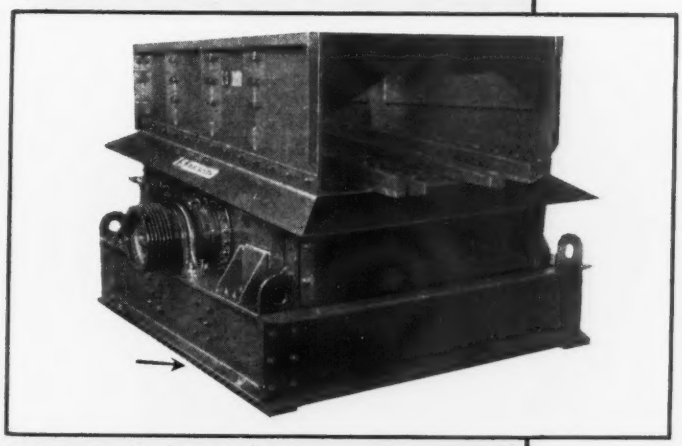
(*Concluded on page* 214)



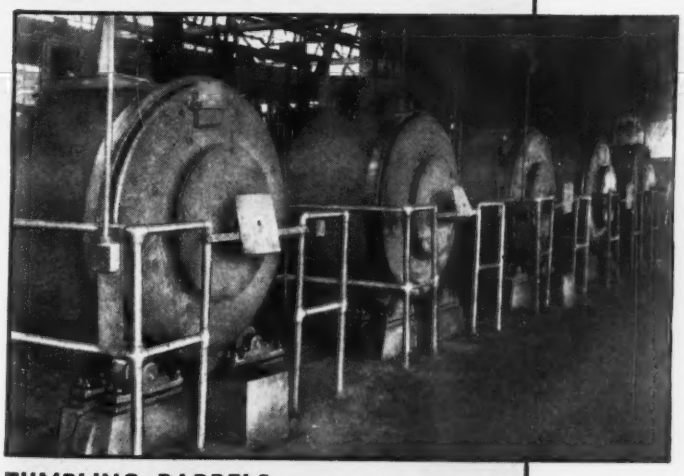
FABREEKA



JOLT MOULDER



SHAKEOUT MACHINES



TUMBLING BARRELS

IT PAYS TO SPECIFY FABREEKA

Mountings For

FOUNDRY MACHINES

THE FOUNDRY is one of a wide variety of industries in which FABREEKA has been used for many years for mounting heavy equipment where the absorption of impact shock and the isolation of transmitted vibration is desired. By adjusting itself to slight inaccuracies of bearing surfaces, FABREEKA distributes the load properly, prevents chipping or breaking of concrete and prolongs the life of both machines and building. FABREEKA reduces noise, prevents structural fatigue, helps maintain alignment, eliminates grouting, and reduces maintenance and breakdowns. FABREEKA is built to give years of service under the most severe operating conditions.

Write For Latest Engineering Data

FABREEKA PRODUCTS COMPANY
INCORPORATED
222B SUMMER STREET, BOSTON 10, MASSACHUSETTS
NEW YORK CHICAGO DETROIT SPARTANBURG
PHILADELPHIA PITTSBURGH OAKLAND

HAUSFELD FURNACES

FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Concluded from page* 212)

provided for all moving parts. The vibrator is positioned on the bed. The sum total of all techniques employed adds up to a figure all foundries like—a phenomenally low rate of casting rejects—less than 1 per cent.

Chautauqua is proud of its foundry personnel. This pride results from the fact that both President Jones and Superintendent Lambrix are World War II veterans and have an abiding respect for the capabilities of GI Joe, from whose ranks came practically every member of the foundry crew.

OBITUARY

ARNOLD LENZ, 64, vice president, General Motors Corp., Detroit, and general manager, Pontiac Motor Division, Pontiac, Mich., died July 13 in an automobile-train collision near Lapeer, Mich. Mr. Lenz, a native of Germany, came to the United States

ARNOLD LENZ

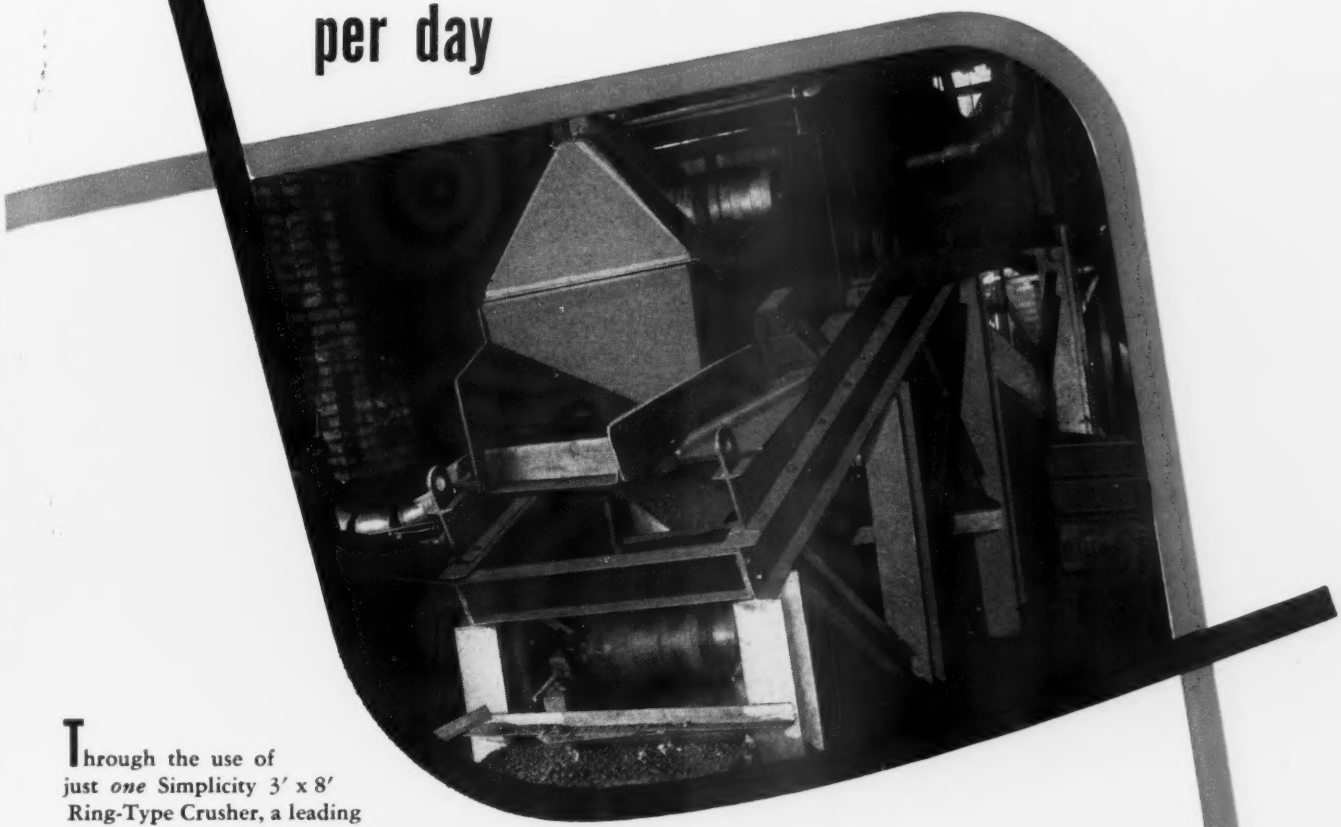
when he was 18 and attended New York State Normal School. Following work in Ohio foundries, in 1916 he joined Buick Motor Co. foundry, Flint, Mich., where he became assistant superintendent. At Chevrolet-Saginaw Gray Iron Foundry Division he developed its first conveyorized foundry. He became executive assistant to Pontiac's general manager in 1947, and general manager in 1951, becoming General Motors vice president later in the year. Mr. Lenz, who was a past director of the American Foundrymen's Society, received its J. H. Whiting Gold Medal in 1935.

* * *

Wallace T. Montague, vice president, Norton Co., Worcester, Mass., died July 30. Mr. Montague was a director of the Grinding Wheel Institute, and former board chairman of both the Grinding Wheel Manufac-

(*Continued on page* 216)

simplicity 3′ x 8′ ring-type crusher recovers about 400 tons of sand per day



Through the use of just *one* Simplicity 3′ x 8′ Ring-Type Crusher, a leading automobile manufacturer realizes savings of about 400 tons of sand daily in grey-iron foundry operations.

In this installation, lumps of sand, especially those from cores that do not break up in shakeouts or screening, are fed to the Simplicity Crushing Screen instead of being hauled to the dump, as is the practice in many foundries. The recovered sand is returned by conveyor to sand storage and mulling equipment thus making appreciable savings in new sand requirements as well as eliminating the cost of hauling away sand lumps. With a Simplicity, one unit does both crushing and screening. It gives positive crushing action and maximum production of grain-size sand. Simplicity Crushers are available with either one, two, or three sets of rings, depending on the lump size to be crushed.

Simplicity Crushing Screens are in profitable operation today in foundries producing magnesium, aluminum, steel, malleable iron, and grey iron castings . . . why not put one to work in your foundry?

A Simplicity sales engineer will be glad to give you the full story. Write us.

103

Sales representatives in all parts of the U. S. A.

FOR CANADA: Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario

FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED
ENGINEERING CO. • DURAND, MICHIGAN

"Certified" Abrasives

CLEAN MORE CASTINGS PER DAY!

SPEED UP production in in *your* blast cleaning room with "Certified" Abrasives. "Certified" Samson Shot and Angular Grit are first choice in hundreds of foundries...give better, longer performance because they're made *extra-tough* by a special *automatically controlled* hardening process. Specify "Certified" and start cleaning more castings per day.

All sizes graded to S.A.E. specifications

Experienced Foundrymen say:

Always specify "Certified"

ACCEPTED AND USED FOR OVER 55 YEARS

PITTSBURGH CRUSHED STEEL CO., Pittsburgh, Pa.

STEEL SHOT AND GRIT CO., Boston, Mass.

MEMBER FEMA

(*Continued from page* 214)

turers' Association and the Abrasive Grain Association. He began work for the Norton Co. 40 years ago in the research laboratory, and joined the sales department in 1914. He was made head of sales engineering in 1916, and assistant sales manager,

WALLACE T. MONTAGUE

Abrasive Division in 1919. In 1922 he was made assistant sales manager, Grinding Machine Division, and sales manager a year following. From 1929 to 1932 he was assistant sales manager of the company, and then was director of sales, Abrasive Products Division until 1935, when he was made manager, sales planning and development. He was made vice president and manager of business planning and development in 1942.

* * *

Arthur E. McClintock, 77, who retired in 1945 as commissioner of the National Foundry Association, Chicago, died July 18, in Oak Park, Ill.

ARTHUR E. McCLINTOCK

Mr. McClintock was graduated from Albion College in 1898, when he joined the National Foundry Association in Detroit, shortly after it was organized. In 1906 he established a branch

(*Concluded on page* 218)

NEW Cedarapids Schrock Motorized HEAD PULLEYS

Built by IOWA

SIMPLIFY EVERY BELT CONVEYOR AND BELT-BUCKET ELEVATOR INSTALLATION

IT'S COMPLETELY DIFFERENT FROM CONVENTIONAL CONVEYOR DRIVES

Everything is contained **INSIDE** the pulley!

ELIMINATES ALL MAINTENANCE ON SPROCKETS, CHAINS, JACK-SHAFTS, V-BELTS, ETC.

U.S. Pat. No. 3548399 Others Pending

WHAT A *Motorized* HEAD PULLEY IS

THIS is a revolutionary departure from the conventional types of conveyor drives. A *motorized* head pulley is a fabricated steel pulley with *everything*... electric motor, reduction gears and all moving parts . . . contained inside the drum! It's simply a new application of the long-proven gear reduction drive, and because of its simplicity, it's the answer to the maintenance man's prayer. 70% to 90% of conveyor down time is saved by eliminating all countershafts, speed reducers, sprockets, chains, Universal shaft drive and other parts necessary with conventional pulley drives. Motorized Head Pulleys are simple to install and flexible in use, completely interchangeable and adaptable to all types of belt and belt-bucket conveyor installations. By means of a simple adapter, a single pulley can be utilized in any of several belt locations, operating various widths of belt, or changing from larger or smaller horsepower. Pulley sizes range from 5 to 30 HP and are available in various widths. A Motorized Head Pulley is safe, because there are no sprockets, chains, jack-shafts, V-belts, etc. to endanger personnel. It's compact...requires no more room than a conventional pulley. Complete protection from weather, grit and dirt also reduces maintenance. Cedarapids Schrock Motorized Head Pulleys have been job-tested for many years under severest working conditions.

HOW IT WORKS

The pulley shell rotates about the electric motor, which is held stationary by means of a torque arm attached to the conveyor frame. The speed of the shell depends upon the combined reduction ratio of the various pinions and gears contained within the pulley shell. This reduction starts with a primary pinion mounted on the motor shaft and ends in the ring gear attached to the shell. The shell in turn then drives the conveyor belt. Leads to the motor enter the head pulley through a hollow conduit passing through the drum end bell and bearing. A simple oil bath gear compartment provides a lubricating bath for the reduction gears and front motor bearing. Motor and head pulley are cooled and ventilated by holes in the drum.

GET COMPLETE DETAILS TODAY

Find out all the advantages of converting your conveyor installations to motorized efficiency before you need head pulley replacements. One internationally known company has 50 Motorized Head Pulleys installed on widespread conveyor operations, and plans more for every installation that requires replacement. Get complete details about every feature. See your distributor today, or write direct to Iowa Manufacturing Company.

IOWA MANUFACTURING CO.
Cedar Rapids, Iowa, U.S.A.

Western Sales:
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351 California St., San Francisco 4, Calif.

RIGHT for YOU

because we use the RIGHT COAL to make New England FOUNDRY COKE

Continuous research is necessary to meet the changing requirements of modern industry.

Our new coal research laboratory

is typical of the modern facilities and resources now available to us to help produce a high quality New England Foundry Coke which will satisfy your exacting demands.

NEW ENGLAND COKE

NEW ENGLAND COKE COMPANY

Subsidiary of

Eastern Gas & Fuel Associates

250 Stuart St., Boston 16, Mass.

HUbbard 2-8400

(*Concluded from page* 216)

office in Chicago and served as assistant commissioner until 1910 when he was elected to the chief staff position in the organization.

* * *

William L. Lewis, 68, president, Chicago Pneumatic Tool Co., New York, died June 28. Mr. Lewis was born in Wales and came to America in his childhood. He worked first for a Bridgeport, O., lumber company and joined Bethlehem Steel Co. where he later became assistant controller. In 1930 he was elected vice president-secretary-treasurer of Chicago Pneumatic and became president in 1946.

* * *

Charles F. Hutchins, 81, president and one of the founders of Standard Foundry Co., Worcester, Mass., died July 23. Mr. Hutchins worked for Crompton & Knowles loom works before founding Standard Foundry.

* * *

Edward F. Voss, 60, vice president, Blackhawk Foundry & Machine Co., Davenport, Ia., died July 31 after an extended illness. He formerly was vice president and sales manager of Voss Bros. Mfg. Co., Davenport, Ia.

* * *

Ingwald M. Larson, 67, secretary, Claud S. Gordon Co., foundry product suppliers, died July 9, while vacationing in Wisconsin. Mr. Larson had been associated with the company for over 25 years.

* * *

John Schneider, 48, Cleveland Electric Illuminating Co., Cleveland, died there July 7. He was active in the American Foundrymen's Society and a past director of the Northeastern Ohio Chapter.

* * *

George J. Kienzle, 76, retired secretary-treasurer, Fulton Iron Works Co., St. Louis, died June 26. Mr. Kienzle retired in 1951 after 40 years of association with the company.

* * *

Edwin Borleske Sr., 50, foreman of No. 1 foundry of Allis-Chalmers Mfg. Co., Milwaukee, died in July. He had been employed by Allis-Chalmers for 30 years.

* * *

Charles Smith Beard, 65, founder and owner of Beard Foundry & Machine Works, Arkansas City, Kans., died in July.

* * *

Ralph B. Jones, 56, sales service manager, Osborn Mfg. Co., Cleveland, died July 6.

* * *

Kenneth L. Green Jr., 43, president, Green Foundry Co., St. Louis, died April 28 of heart disease.

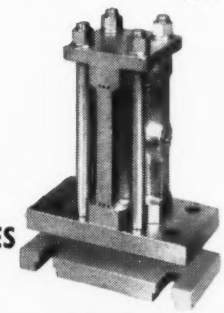
Quiet, EFFICIENT CANNON VIBRATORS SPEED MATERIAL FLOW . . .

● Process materials flow freely when you use Cannon pneumatic vibrators. They keep stubborn, sticky materials on the move, eliminate arching and plugging. Patented Quiet-Type design assures semi-noiseless operation, results in trouble-free service.

For a new high in vibrator efficiency and economy try a new Quiet-Type vibrator. Available in a wide range of styles and sizes, they are guaranteed for continuous or intermittent operation at any air pressure. If you will outline your requirements, we will recommend the Cannon vibrator that will give you top efficiency for your needs.

A-5892

- CHUTES
- BINS
- HOPPERS
- MOLDING MACHINES
- MATCH PLATES
- SHAKE-OUTS



STYLE "EM"
Piston Diameters: 1¼" to 5"
Vibrator Weights: 12 lbs. to 180 lbs.

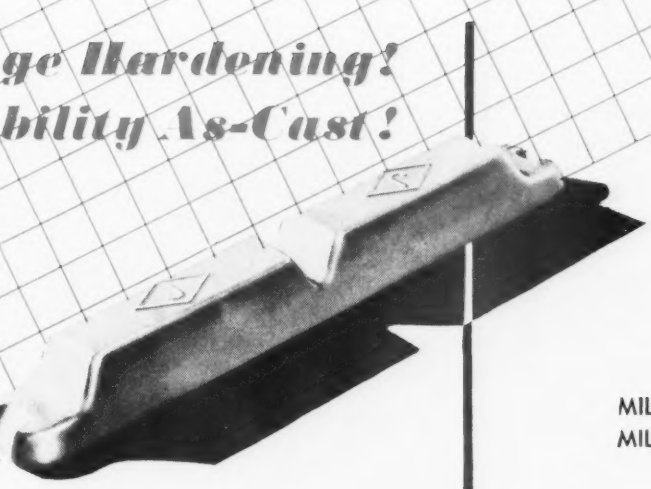
STYLE "A"
Piston Diameters: ⅜" to 2"
Vibrator Weights: 1 lb. to 11½ lbs.

STYLE "B"
Piston Diameters: 1" to 2"
Vibrator Weights: 4½ lbs. to 25 lbs.

CANNON

VIBRATOR COMPANY
1111 POWER AVE., CLEVELAND 14, OHIO

No Age Hardening!
Instant Stability As-Cast!



with

MILITARY SPECIFICATIONS:
MIL-A-10935-6-7 (QQ-M-151)

ALMAG 35

Aluminum Casting Alloy

Check these Properties

33,000 to 44,000 p.s.i. Tensile Strength *As-Cast*

Elongation 11 - 15% in 2" *As-Cast*

Greatest Stable Shock Resistance of any Aluminum Alloy

Dimensionally Stable *As-Cast*

Requires No Heat-Treatment

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Complete data and specifications on Almag 35 Aluminum Casting Alloy.

Here's an alloy which immediately answers your casting and design problems of high tensile strength, ductility and shock resistance — of dimensional stability and free machining.

Almag 35 combines all of these properties instantly, as-cast — with no heat treatment required and properties constant for the life of the casting.

Specify Almag 35 on your requirements and save heat-treating operations, costs, possible inherent fatigue failure and warpage.

WILLIAM F. JOBBINS INCORPORATED
P. O. BOX 230 AURORA, ILL.

Band-Sawing Castings

(*Concluded from page* 113)

dependable precautionary measure.

Copper Brass Alloy Castings—Very few of these materials are cut at speeds exceeding 400 fpm. Hardness and sawability vary with the analysis of the alloy. As hardness increases, the velocity must be decreased; but the decrease is not necessarily proportional to increased hardness. In short, as the alloy becomes more complex because of such elements that give it added tensile strength and shock resistance, saw velocity must be decreased to meet these conditions.

Lubricants are recommended when chips show a tendency to weld to the saw teeth, especially when one is cutting high-silicon and high-manganese bronze gates and risers. Feeding pressures vary with hardness and work height; a feeding pressure of 25 lb generally applies to a 1-in. thickness. As the material shows resistance to tooth penetration, work pressure must be increased, or the teeth will have a tendency to glaze over the surface. With the application of the proper saw control factor, chip formation on nonferrous materials should not be different from when one is cutting steel. Flaked chips usually denote too fast a velocity.

The only castings in the category of materials herewith concerned that can be cut at rather high speeds are those which contain much copper and are entirely free of manganese, silicon and nickel. Most beryllium copper or 90-10 brass gates and risers which are no thicker than 1 in. will cut efficiently at 2000 fpm with a ½-in., four pitch buttress band. On sections under ½ in., either a six or a ten pitch standard band should be used, with ten pitch applying to a thickness under ¼-in. Above velocity is very exceptional and must be dropped substantially with any increase in thickness.

Cartridge brass and bronze having high lead and tin contents will cut very well at a velocity of 1000 fpm, preferably with a standard band of pitch to suit. For the records, it should be mentioned that a 2000-fpm velocity exceeds the maximum of the low-speed range by only 500 fpm. A velocity of 1000 fpm is obviously high when one is speaking of low-speed sawing, and from here on velocities drop to 400 fpm and as low as 100 fpm for cutting thick sections of high-silicon bronze.

The following types of materials are usually cut dry: Copper 99.9, low brass, red brass, spring brass, aluminum brass, manganese bronze, (1% Ni-1% Si), brass 70-30, cartridge brass, leaded brass, naval brass, beryllium copper, low-silicon bronze (1% Si).

If and when some form of lubrication is desired, either the drip method at the rate of 60 drops of cutting oil per minute, or the spray system with the correct proportion of soluble oil and water, can be applied. Spray lubrication is most economical in the long run even if high in soluble oil. A quart of the mixture will last for about three hours when sprayed directly at the point of saw-work contact under a 40-lb pressure.

Research at Battelle

Battelle Memorial Institute, 505 King Ave., Columbus 1, O., has published a booklet, "Battelle Research in Engineering Economics," which outlines services available to various branches of industry. How the institute aids management planning, scope of its engineering economic activities, and how it serves industry, are included in the brochure.

OUT OF THIS WORLD FOR WEAR!

PARACOAT

Pattern Finish

LASTS LONGER...DRAWS CLEANER...SAVES TIME

- Maintains its hard, smooth, tough, wear-resistant surface under all foundry conditions. Patterns draw clean with no damage to molds.
- Resists sand wear because of its rubber content. Users report 10 to 50 times the life of shellac and other finishes.
- Does not become sticky or tacky even when hot damp molding sand is rammed around Paracoated patterns.
- Finger dries in about 15 minutes—2 coats in 30 minutes.
- Requires no change in regular practice. Easily applied by brush, spraygun, or dipping.
- Can be applied to new, old, or repaired wood patterns. Does not raise the grain.
- Eliminates warping of patterns by preventing absorption or loss of moisture.
- Allows patterns to be stored in open sheds without danger of mildew, mold, or warping.

WHAT PARACOAT IS

Paracoat is a unique pattern coating containing rubber and other special modern chemicals carefully compounded in fast-drying solvent known as Parasolv. Represents many years of practical experience, research, and effort to build the ideal pattern coating.

WHAT PARACOAT DOES

Paracoat gives an ideal protective coating to wood, plaster, and metal patterns and core boxes. Because of its unusual characteristics, it is used for many other purposes in pattern, model, and woodworking shops. Taking the place of ordinary varnishes, lacquers and paints, it gives added protection from moisture, acids, alkalis, corrosive gases, etc.

WHY THOUSANDS USE IT

Paracoat gives better results at less cost. Thousands of wood and metal shops here and abroad increase their profits with Paracoat.

WRITE DEPT. F7 FOR LITERATURE

Also ask about PARASPRAY, the modern core and mold surface conditioner, and BONISPRAY, the permanent mold and die dressing.

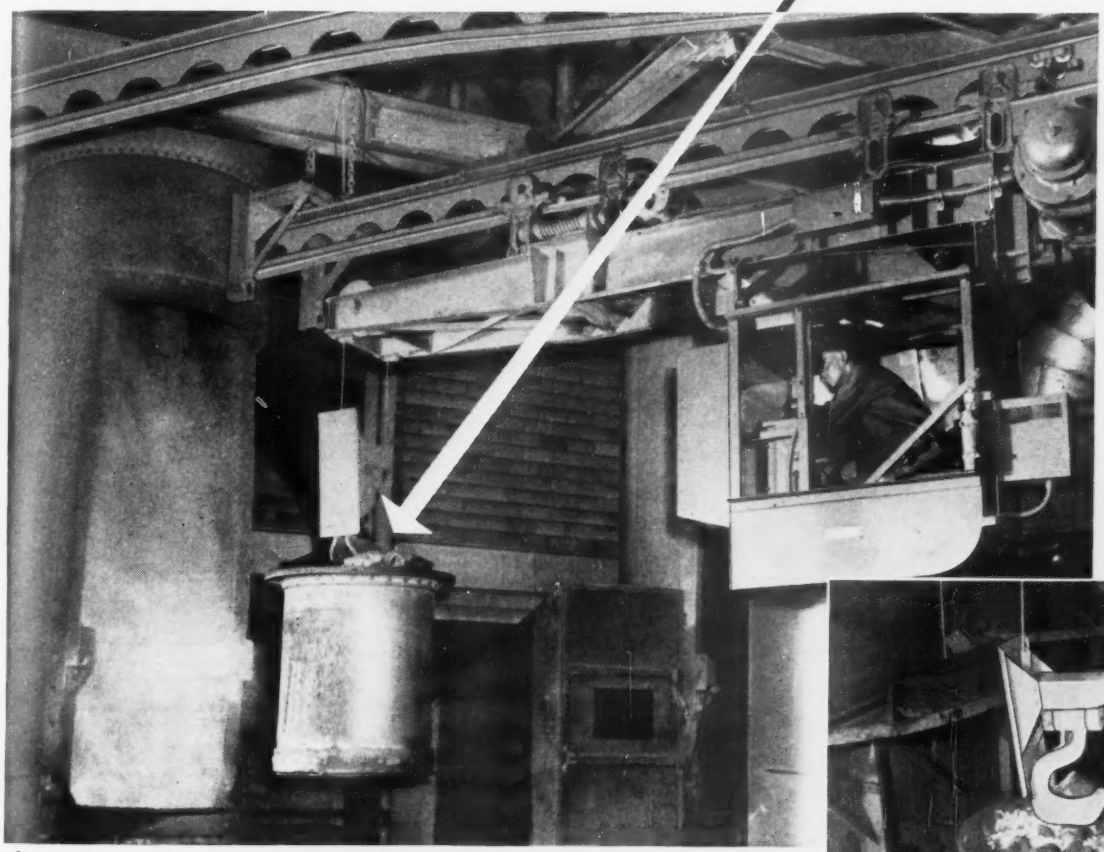
Para Products Have A Place in Every Foundry

FOUNDRY RUBBER
INCORPORATED

4914 Bethesda Ave., Bethesda, Maryland
Phone: OLiver 1022

A Radically Different
CUPOLA CHARGER

2400 lbs. per charge
22 trips per hour

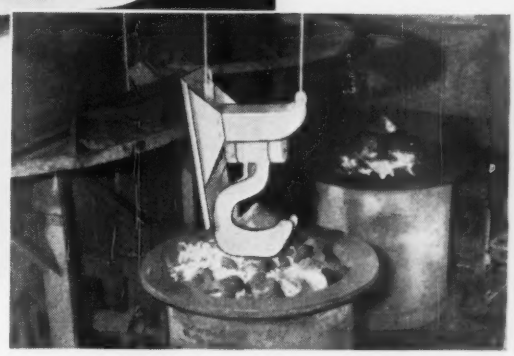


A

A
Every 3-minute period a 2400 lb. charge is delivered from the charging floor to any of 4 cupolas with this Tramrail charger.

B
Buckets on floor far below Tramrail System can be hooked or unhooked by means of the special hook by the cab operator alone.

C
One charging carrier operating on this Tramrail track and switch system serves the 4 cupolas which are operated in pairs on alternate days.

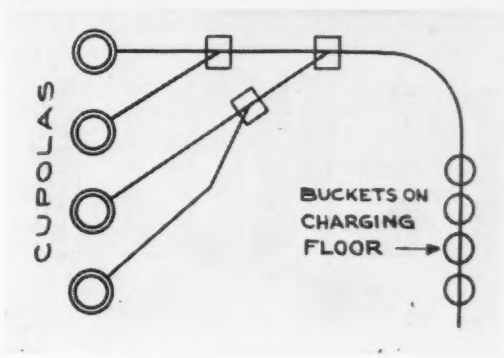


B

Here is a tried and proven Cleveland Tramrail cupola charger that is different from others in that the cab operator alone can hook and unhook charge buckets by means of a special hook without leaving the cab and without assistance of floor men.

A bucket is hoisted from the charging floor, far below, and delivered to anyone of four cupolas. When lowered into a cupola, the materials drop out as the cone-shaped bottom separates from the bucket shell. The Tramrail operator then returns the empty bucket to the charge floor.

This highly efficient cupola charger has been in successful operation in a prominent mid-western foundry since 1940. Iron is melted continuously 20 hours per day.



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How to Make a Mold For a Pulley Casting

ABC of Foundry Practice

By PAT DWYER, *Engineering Editor, FOUNDRY*

IN foundries specializing in power transmission machinery, gray iron pulleys are made in considerable quantities. Necessary equipment is provided, and the molders do not need to decide how they are going to handle the job. Through repetition the work is standardized and becomes routine in character. However, these conditions do not obtain in the ordinary jobbing shop where a pulley is made only occasionally.

If the face of a pulley is comparatively narrow compared with the wheel diameter, the best production method probably is to build up a ring pattern and turn it to the required size. Under certain conditions it may be advisable to make a full set of arms and hubs, but usually it is more economical and convenient to make a half-arm corebox and make the arms in dry sand cores to be set inside the ring pattern as in Fig. 1. If the face of a pulley is unusually wide, the jobbing foundryman dispenses with a ring pattern. He employs two sweeps and a corebox (Fig. 3) to make the mold.

The most extreme care and accuracy must be observed in setting the sweeps and cores and in assembling the mold so that the resulting casting will balance and run true when in service. Many wheels run at great peripheral speed. The least deviation in balance will result in rupture.

Either one of two methods may be adopted to form the mold. If no suitable flask is available, the entire mold may be made in a pit in the floor by providing a circular lifting plate (Fig. 4) on which to build the core or body of sand forming the inside of the mold. This part of the mold is lifted out and set to one side while the exterior part of the mold is being formed. Afterward it is returned to place. The space between the inside body of sand and the outside face of the mold constitutes the mold for the wheel rim.

In the second method, the body of sand forming the inside of the wheel is not disturbed. It is allowed to stand on the drag or on the floor. A flask equipped in a suitable manner with some form of lifting device (Fig. 5) is employed to cheek-off the outside of the mold. After the mold is finished, the cheek is returned to place and either weighted or clamped to hold it in place when the mold is filled with metal. Principal reasons for parting the mold, by removing either the cheek or the core temporarily, are to permit application of wet or dry blacking to the faces and to permit skin drying inside and outside faces of the mold in case wet blacking is used.

The following sequence covers briefly the molding of a 63-in.-diam pulley having a 3-ft face and two set of arms. Instead of the usual oval H or T section, the arms are flat, 2 in. thick, 6½ in. wide at the hub and 5½ in. wide at the rim. Each hub—17 in. diam, 11 in. high—is split on a diametrical line. Bolt holes through the splitting lugs on the hubs were formed by dry sand cores. Since the pulley was designed for a V-drive belt, the rim was cast 2 in. thick. Twenty-one grooves later were machined on the face, as shown in the accompanying illustration of the casting on the boring mill.

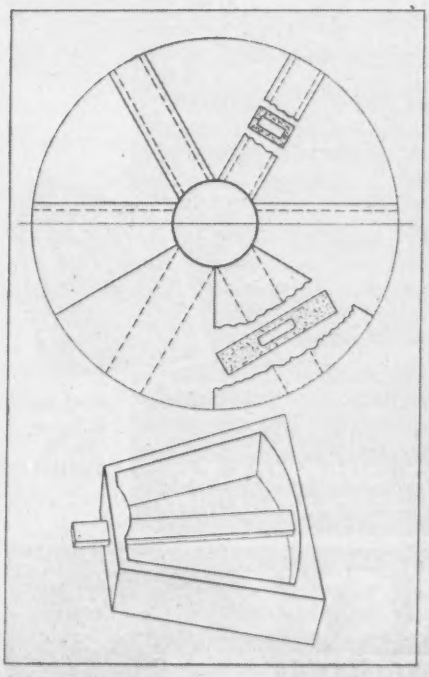

Fig. 1 (top)—Dry sand cores for arms are set inside ring pattern. Fig. 2 (center)—Cores made in the corebox shown at Fig. 3 (bottom) are set in this swept-up mold

Under certain conditions a loam mold would be the most satisfactory for this type of casting. If a number of castings were on order, the outside wall would serve for several castings, thus representing considerable saving in time. This is particularly true where the shop has loam molding facilities. In some cases the only molder in the shop accustomed to the use of sweeps is a loam molder. He is allowed to make the casting in the manner with which he is familiar. A casting made in a loam mold is insured against distortion, cold shuts, blow holes and other forms of defects incident to castings made in sand molds. For that reason a man may be inclined to adopt that method.

However, perfectly satisfactory castings can be made in properly prepared sand molds. Since the method of sweeping and assembling the mold is always the same, irrespective of the material employed, we shall assume for the purpose of illustration that the mold is made in sand and skin dried.

Every jobbing foundry capable of handling medium and heavy castings is provided with a spindle, spindle seat and arms. In this instance the only pattern equipment required will be two sweeps, one-half a corebox to form the arms, and one corebox to form the hub above and below the arms. Two arms in the upper hub and two arms in the lower hub are plain. Right and left loose pieces in the hub end of the corebox form the hub extensions that hold the splitting cores and the bolt cores. Usually a stock corebox is available to form the center core. If the hub is to be split, it will be necessary to provide a corebox and core prints for that purpose. Small right and left blocks form openings in the arm cores for passage of the lifting hooks.

In the mold the top of the rim may

be either open or covered. Long-established practice favors the open top. An attendant armed with a long ¼-in. steel rod watches the rising metal and dislodges any little lumps of dirt that tend to form and stick to the wall of the mold or the core, especially at the point where the arms join the rim.

Where for any reason it is desirable to cover the rim, flat segment cores may be employed. Convex and concave ends on this type of core render it universal in application. Cores from one corebox will fit almost any circle. The cores may be held down with small weights, by a circular plate or by a cope rammed full of sand.

Where for want of a flask or for any other reason the mold is made in a pit in the floor, a level bed is swept on the bottom of the pit and on this bed the lifting plate is rapped down firmly. The following description applies when the inside part of the mold, with the arm cores and hub cores in place, is built up first, then lifted out and set up on a vacant place on the floor while the molder readjusts the sweeping apparatus and builds the outside of the mold. The alternative method in which the outside is built first and lifted out of the pit while the molder is building the inside of the mold will be described later.

Sand is rammed over the remainder of the bed and swept off flush with the upper surface of the plate. Measuring up from the plate, one places suitable marks on the spindle to indicate the position of each lower half-hub core. Since two sets of arms are equally spaced in a distance of 36 in., it is apparent that the center line of the first set of arms will be at a point 9 in. above the bottom. The center of the top set will be 9 in. from the top, with a distance of 18 in. between centers of the two sets. In arranging a bed on which to set the arm cores one must take the thickness of the cores into consideration. If we assume that the half core is 4 in. thick, the body of sand destined to form the inside of the mold will be

(*Continued on page* 226)

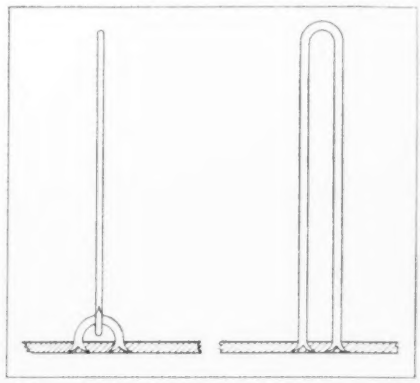

Fig. 4—Short or long lifters may be attached to lifting plate

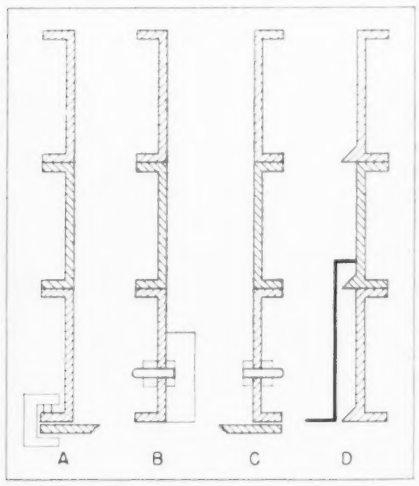

Fig. 5—Devices for cheeking off

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LET'S KICK IT AROUND

By TOM BARLOW

That fishy, fishy in the bubbling brook—
Here's how to catch him with your baited hook,
And why, if sand for cores must perfect be,
Your canny core room foreman is the man to see.
—Ignominious

Although sand hasn't much to do with fish, foundry practice frequently reminds me of fishing. Maybe that's because everything reminds me of fishing. Anyway, as a special give-away, absolutely free, this month only, we will include, with our usual package of philosophy and wisdom, a valuable hint on how to catch a wall-eyed pike. (Sometimes known as Susquehanna salmon, jack salmon, pike perch or simply wall eyes.)

When fishing in Burt Lake, Michigan, I inquired as to the best lure for walleyes. Most experts agreed on a black and orange trolling flat-fish (T-4, I believe). I tried it for three days and caught a few, but every one around me caught more. Finally, I snooped around and found one of the other fishermen hanging a huge gob of night crawlers on each of the rear treble hooks . . . That, son, was the secret. From then on, I did much better.

The moral of the story is that sometimes, when you ask a simple question, you get a simple answer. If you don't watch for those important little details, you may miss the boat (or fish).

In sand practice, also, those "minor" details make all the difference. For example, foundry men usually specify the sand they buy to add to the system, but they don't all ask the core room foreman what he is using. You wonder why they should? Because—THE CORE ROOM FOREMAN CONTROLS THE MOLDING SAND!!!

You don't believe that? . . . I can prove it!

For years, we have known that the principal control of molding sand was screen distribution. (Believe it or not, the four-screen sand is not a recent invention. It's been recommended for 20 years). Now listen. The core room man has many mixes. He buys sand to give maximum permeability and minimum oil consumption. He blends two, three or four sands in many proportions to meet his needs. Every day his consumption of each type of sand may change. Most of that sand eventually shakes out into your molding system. Therefore, the core room is your principal sand supplier! *What is he shipping to you?*

Is it three-screen, four-screen or five-screen sand? Is it a peaked curve, a double-peak or triple-peak sand? What percentage of 30- and 40-mesh does it contain? Is it possible to make smooth castings from such a sand—and if so, how?

If the core sand contains a lot of 30- and 40-mesh, you will not make maximum finish on your castings.

If you "buy" a three-screen coarse sand from the core room, use a clay like Revivo, with high cushion, high volume and low permeability. (Keep a little wood flour or cereal on hand, too.)

If you are getting a five-screen sand, use Black Hills Bentonite or Dixie Bond and look out for high water or excess cushion materials.

If you are getting a "double-lump" sand, you are in real trouble. You must either talk the core room into changing or you must add a sand which will fill in the missing screens and make a smooth curve.

Both the core room and sand man must recognize the need for cooperative control of sand distribution. Or, to get back to fishing, the core room foreman is picking the lure, so be darn sure you add the proper "live bait". Then you'll both eat better.

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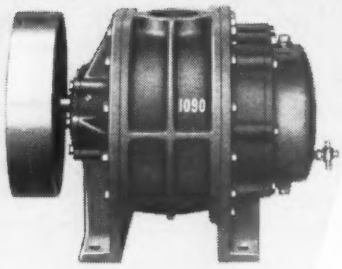

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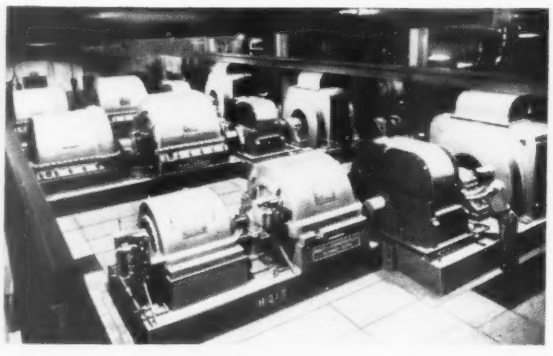

ROOTS-CONNERSVILLE BLOWER

BLOWER BUILDERS SINCE 1854

A DIVISION OF DRESSER INDUSTRIES, INC.

(*Continued from page* 224)

rammed and swept off at a height of 5 in. The lower half of the bottom hub core and the first set of arm cores are adjusted true and level.

The sand then is rammed to a height of 23 in. from the bottom. At this point the lower half of the upper hub core and the upper set of arm cores are placed in position. Sand then is rammed to the desired height. The inside sweep is attached to the spindle arm, and the face of the core is trimmed to the correct shape. Spindle and sweep are removed. The crane is hooked on by three chains terminating in turnbuckles to the three hooks which extend to the bottom plate. The entire body of sand is lifted out of the pit, set up on blocks, blackwashed and skin dried.

A large bottom board or several shorter boards are laid on the sand surface recently covered by the lifting plate. The molder stands on the boards while sweeping the outside wall of the mold. A temporary ring or miscellaneous barricade conforming approximately to the diameter of the wheel is adjusted in place, and sand in successive courses is rammed between the ring and the wall of the pit. The ring or barricade is removed, the outside sweep is attached to the spindle and the superfluous sand is removed. Spindle and sweep are removed for the last time, and the outside face of the mold is blackwashed and skin dried in any convenient manner, by a small coke basket, a wood or charcoal fire, a gas or oil burner, or a torch. The mold then is assembled and closed.

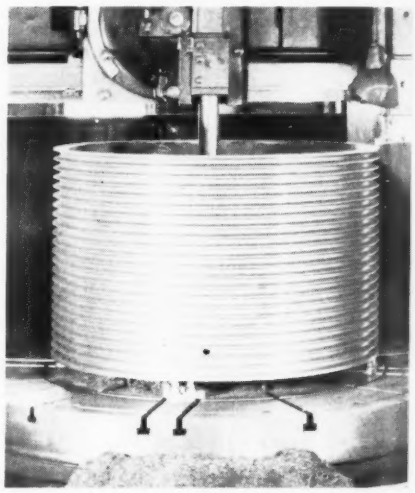

Fig. 6—Machining the face of a 63-in. diam V-belt drive pulley

When the mold is covered by a plate or cope, the weights are ap-

(*Concluded on page* 228)

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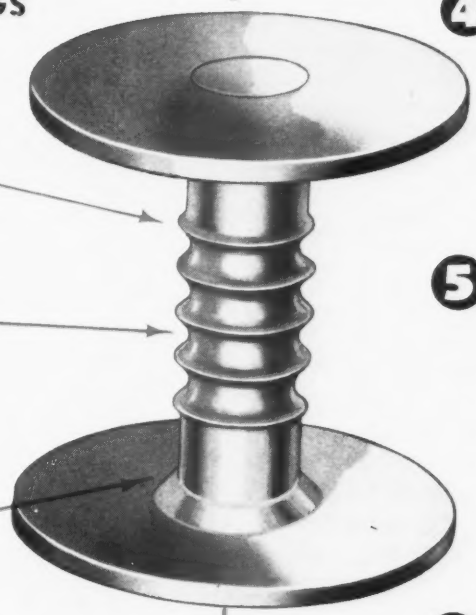

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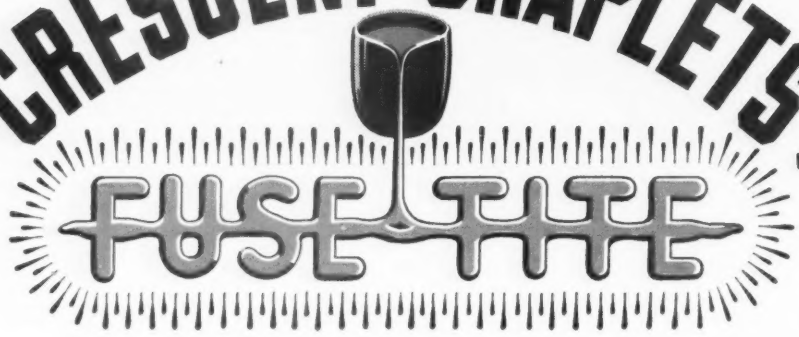

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(*Concluded from page* 226)

plied in the usual manner. If the mold is poured *open*, it is necessary to bed a plate on top of the interior part of the mold, preferably before it is swept to shape. After the mold is closed, long binder bars or rails are placed in position on top. The weights are placed on the binders, and the plate is wedged down from the binders. In addition to this precaution, it is customary on large wheels to clamp the arm core halves together to prevent them from straining apart under pouring pressure.

In the second and usually preferred method, the outside of the mold is formed first and lifted out of the way, and the inside part of the mold containing the arms and hubs is built on the drag, or bottom of the pit.

(*To be concluded next month*)

NFA To Hold Annual Meeting in Chicago

The fifty-fourth annual meeting of the National Foundry Association will be held at the Edgewater Beach Hotel, Chicago, Sept. 18-19. The program will feature discussions of safety, economics, government, labor relations, and finance. A labor-management panel discussion is included. The report of activities of the organization will be presented by A. V. Martens, Pekin Foundry & Mfg. Co., Pekin, Ill., and president of NFA.

The meeting of the Administrative Council will be held at 10 a.m. and the Alumni Dinner at 7 p.m. on Wednesday, Sept. 17.

The tentative program is as follows:

Thursday, Sept. 18

Morning session:
Report of President, A. V. Martens
"Safety," William N. Davis, director, Safety and Hygiene program, American Foundrymen's Society
"Economics," George W. Mitchell, vice president and chief economist, Federal Reserve Bank of Chicago

Luncheon:
"Government," Hon. Joseph McCarthy, U. S. Senator from Wisconsin

Afternoon session:
"Labor Relations," James J. Reynolds, vice president, United States Pipe & Foundry Co., former member of the National Labor Relations Board, 1946-51
"Finance," Phil Hanna, financial editor, *Chicago Daily News*

Friday, Sept. 19

Morning session:
Labor-Management Panel Discussion: Open discussion of critical issues currently being met at the bargaining table. Panel members: Clinton S. Golden, former vice president, United Steelworkers of America (CIO), labor representative; W. H. Story, vice president and general counsel, Allis-Chalmers Mfg. Co., management representative.

Luncheon:
"Key to Peace," Clarence Manion, former dean of the University of Notre Dame Law School

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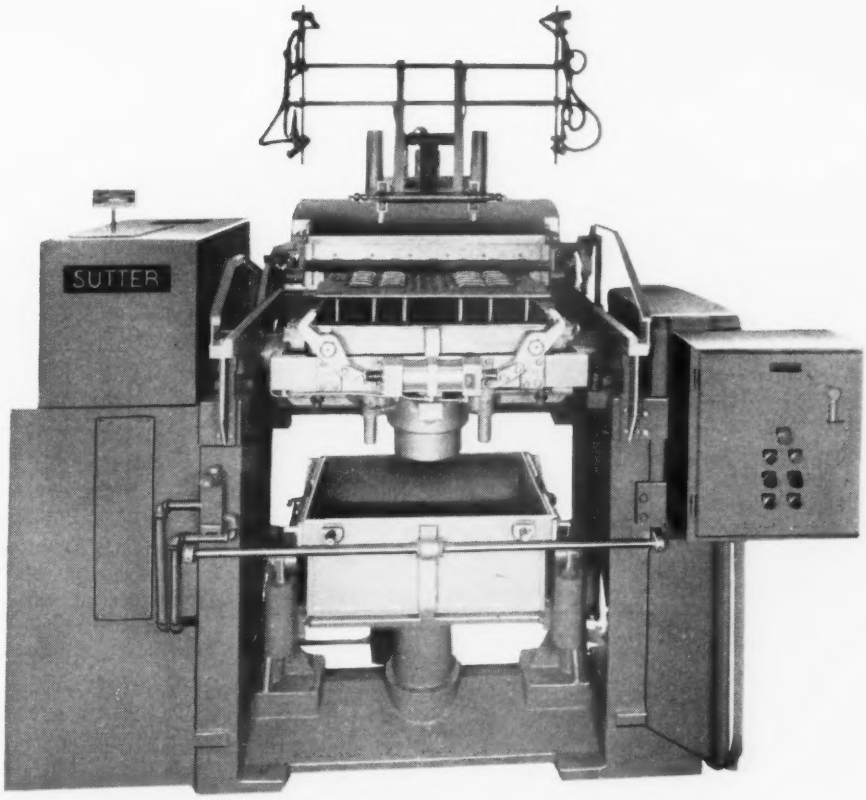

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Industry BRIEFS

STOCKHAM Valves & Fittings Co., Birmingham, has received government approval of an addition and improvements to its plant which will cost about $1,250,000. As part of the expansion program, a new building will be erected to house production facilities for making cast steel valves and another building to house continuous annealing equipment.

* * *

Kaiser Aluminum & Chemical Sales Inc. has established nine new sales offices and appointed five new distributors. Sales offices were opened in Birmingham, New Orleans, Grand Rapids, Mich., Tulsa, Okla., Pittsburgh, Miami, Fla., Baltimore, Evansville, Ind. and Columbus, O. New distributors are at Houston and Dallas, Tex., St. Louis, Pittsburgh and Worcester, Mass.

* * *

Vanadium Corp. of America is starting production of alloys at a new plant near Cambridge, O. Initial operations will consist of melting secondary aluminum and manufacturing aluminum alloys. Production of ferrovanadium, grainal alloys, low-carbon ferrotitanium and other alloys is scheduled to start next spring.

* * *

A new die casting plant to expand production of castings for its various divisions will be constructed by Outboard Marine & Mfg. Co., Waukegan, Ill. To contain more than 80,000 sq-ft on one floor, the building will adjoin the smelting plant, and die casting production will be consolidated with the smelting of aluminum. Construction is to be completed about Jan. 1, 1953 at a cost, including equipment, of more than $1 million.

* * *

Freeman Supply Co., Toledo, O., has been appointed representative in the United States for pattern shop machinery built by Wadkin Ltd., Green Lane Works, Leicester, England. This includes equipment for handling practically all the major operations in wood patternmaking.

* * *

Syntron Co., Homer City, Pa., has organized a Canadian subsidiary, Syntron Ltd., and purchased a manufacturing plant in Stoney Creek, Ont., Can. First item to go into production will be selenium rectifiers. Later products will include vibratory material handling equipment, portable power tools, diesel pile hammers, shaft seals, paper joggers and others.

* * *

First prize in the industrial division of the New York State Association of Architects competition was won recently by the newly completed, modern foundry of the Tonawanda Electric Steel Casting Corp., 30 Island St., North Tonawanda, N. Y. The fireproof structure is constructed of corrugated asbestos panels, glass and brick and is 90 x 140 feet.

* * *

General Motors Corp., Detroit, started clearing land for its new aluminum casting plant at Jones Mills, Ark., on July 30. The new plant will have about 100,000 sq ft of floor space and will employ about 1000 persons at capacity operation. It will produce castings from permanent molds, many of them of the type used in torque converter transmissions.

* * *

Foundry Services (Canada) Ltd. is completing a new plant at Guelph, Ont., for production of its various fluxes, alloys and other foundry products. The company has had a self-contained sales and service organization in Canada for over two years.

* * *

Rosedale Pattern Works Inc. (Foundry Division), Hicksville, Long Island, N. Y., has changed its name to Rosedale Foundry Corp.

* * *

Schaible Co., Cincinnati, manufacturer of plumbing equipment and supplies, has formed three sales divisions, Plumbing and Heating Division, D.

(*Continued on page* 232)

ROTARY KILNS: Basic Refractories Inc., is installing two new rotary kilns at its Maple Grove, O., plant. Each of the kilns is 390 ft long and 11 ft in diam. They will "dead burn" about 2000 tons of dolomite daily to produce granular dolomitic refractories. Feed ends of the kilns where the crushed dolomite and supplemental raw material enters are 18 ft higher than the discharge ends into which powdered coal is fired. The kilns revolve at ½ to 1½ rpm. As the dolomite mixture travels toward the discharge end of the kiln it increases in temperature to more than 3000 F. After heating, the mixture is discharged to a grate and cooled by air blast. It then is ready for shipment

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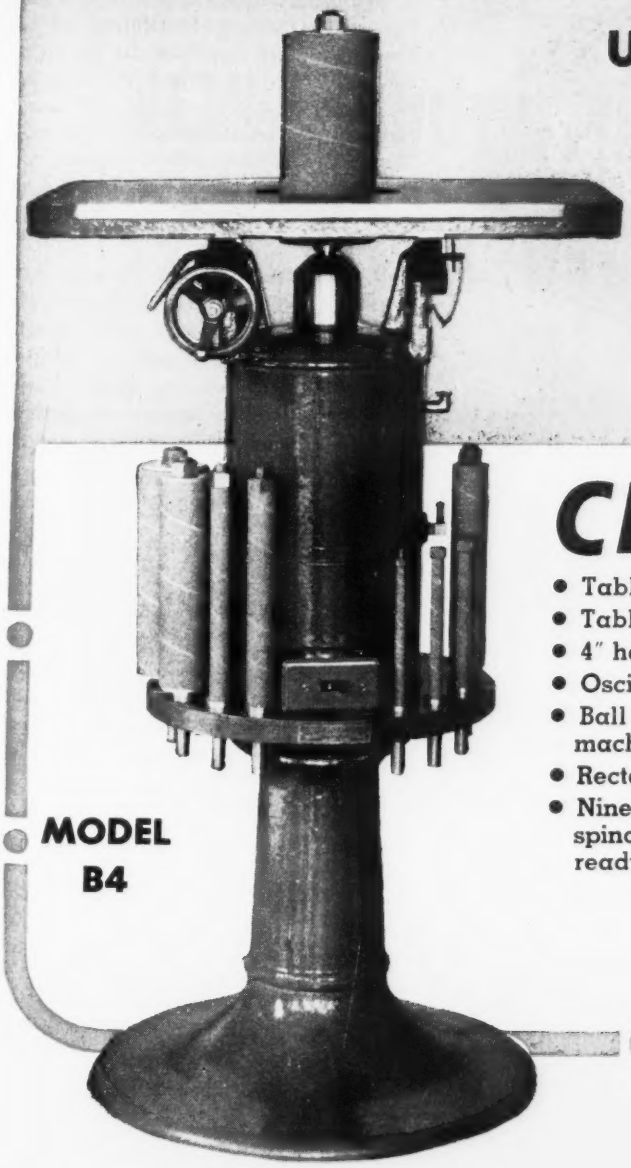

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- Table tilts 45° by worm and gear device.
- Table quickly returned to exact horizontal position.
- 4" hand wheel for tilting.
- Oscillating mechanism runs in oil.
- Ball bearing motor enclosed in machine base.
- Rectangular table 20" x 24".
- Nine quick change spindles (as shown) ready for use.

MODEL D20

STATE 15 AND 20" DISC SANDING MACHINES

These moderately priced, precision built machines are designed and built especially for the pattern and foundry trade. Models available for both wood and metal.

Write for Bulletin No. 652-5

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Pattern Shop and Foundry Supplies and Equipment

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NEED A* Well-Made PATTERN?

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It's simple if you do. Just specify a *Well-Made. Almost a half century of experience on wood and metal.

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The WELLMAN Bronze & Aluminum Co.

DEPT. 7, 12800 SHAKER BLVD.
CLEVELAND 20, OHIO

(*Continued from page* 230)

T. Williams Valve Division and a new Disposer Division. Marketing of all these company divisions will be under the direction of Frank J. Nugent, vice president in charge of sales. Sales and distribution for the new Disposer Division will be under the direction of Ernest G. Maron, divisional director of sales.

* * *

New York Belting & Packing Co., Passaic, N. J., and L. H. Gilmer Co. have consolidated and will operate under the former's name. Gilmer products will retain the Gilmer name and will be sold by the new organization. B. F. Ruether, vice president of New York Belting, heads the expanded organization.

* * *

Danville, Ill., plant of General Motors Central Foundry Division is beginning its fourth major expansion program in six years. Capacity of the gray iron section will be increased 25 per cent, and approximately 150 new employees will be required. Additional equipment will also be installed in the finishing department.

* * *

A new store has been opened at 236 N. Crawford Ave., Chicago 24, by the Syntron Chicago Sales Co., representatives in the Chicago area of Syntron Co. products, including vibratory material handling equipment, power tools, selenium rectifiers, paper joggers and shaft seals.

* * *

Erie Equipment Co., 1628 High St., Erie, Pa., has been appointed industrial truck sales representative in the Erie area for Baker-Raulang Co., Cleveland. L. A. Jensen, owner of Erie Equipment was formerly with the Whiting Corp. as a sales and service representative.

* * *

Paxhia Mfg. Co., Tonawanda, N. Y., brass founders, metalworkers, toolmakers, etc., has been incorporated. Directors are Lynn G. White, 480 Harrison Ave., Kenmore 23, N. Y.; Emanuel F. Paxhia, 750 Ellicott Crook Rd., Tonawanda, N. Y.; and Raymond J. Metzger, 709 Beach Rd., Buffalo 25.

* * *

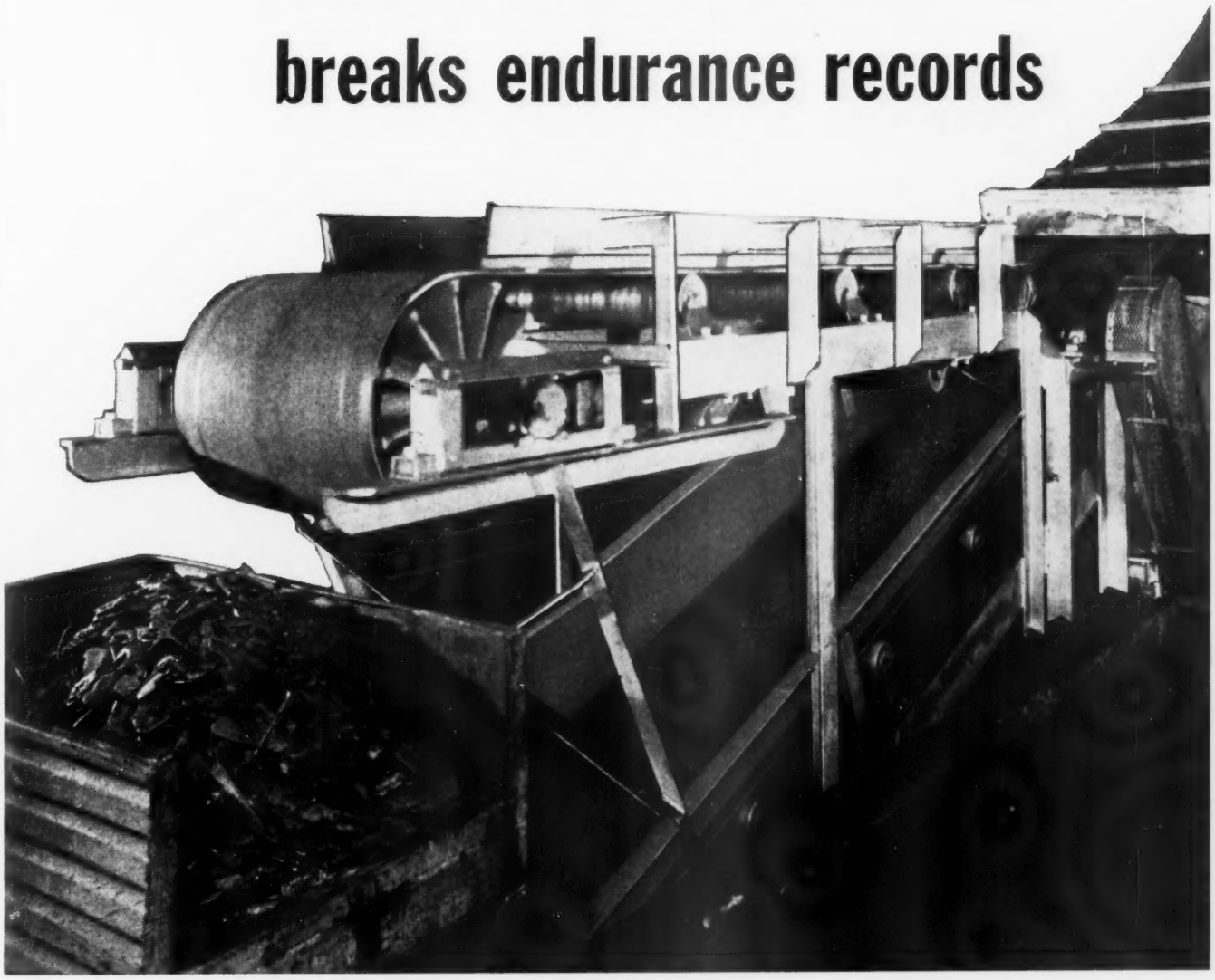
Smith Steel Casting Co., Mineral Wells, Tex., a subsidiary of Smith Steel Casting Co., Marshall, Tex. (formerly Sollberger Engineering Co.), burned recently with a loss of $100,000.

* * *

A Moresi Co. Ltd., Jeanerette, La. marked its 100th anniversary in July. Founded by a Swiss immigrant, An-

(*Concluded on page* 234)

NEW foundry shake-out belt breaks endurance records



In one of the largest gray iron foundries in the world this rip-proof NYB&P Shake-out Belt is still in service after 9 months of working 8 hours a day. This is more than twice as long a service record as any belt previously used! It is 30 inches wide; 5-ply; 110 feet center to center. It is only one of many NYB&P belts in this foundry.

The NYB&P Shake-out Belt is not only ideal for foundries, but also for any installation where there is constant danger of the belt being ripped. You will find that every NYB&P industrial rubber product is outstanding in performance and economy. For full information, contact your local NYB&P Distributor.

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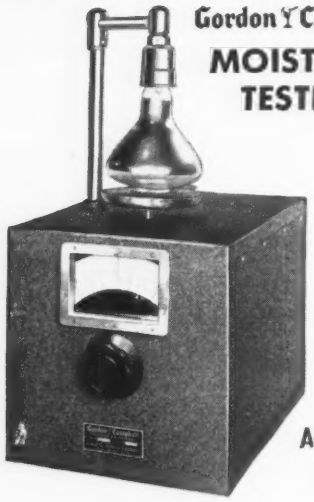
Guessing Moisture Content?

IT DOESN'T PAY!

USE THE Gordon-Campbell MOISTURE TESTER



ACCURATE FAST

The moisture content of sand mixtures is too important a factor in the production of good castings to be determined by guesswork. Frequent testing is the only sure guide to maintaining the most favorable moisture percentage.

The Gordon-Campbell Moisture Tester offers an easy, fast, accurate method of finding moisture content. With only a few minutes required for a test, the sand can be corrected promptly to avoid scrap losses.

Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units.

Gordon-Campbell sand testing units conform to the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRYMAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

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(Concluded from page 232)

toine Moresi, the company is still owned and operated by the Moresi family. It manufactures sugar mill rollers, oil machinery and other heavy machine material.

* * *

Raybestos-Manhattan Inc. has opened a new warehouse at 3012 Canal Street, Houston, Tex., in charge of M. C. Nugent. Raybestos-Manhattan also has appointed Webster-Robinson Machinery & Supply Co. Inc., Tacoma, Wash., as a distributor.

* * *

Randolph Foundry & Machine Co., 2 Sheldon St., Randolph, N. Y., is being merged with Metallic Ladder Co., Washington, which is moving its manufacturing facilities to Randolph. The combined firm will be known as Metallic Products Mfg. Corp.

* * *

Gries Reproducer Corp., 780 E. 133rd St., New York 54, producer of small zinc die castings, wing nuts, buckles, hardware, etc., has appointed the following distributors: A. A. Hume, Minneapolis, and Jay C. Angel Co., Chicago.

* * *

Powdered Metal Products Corp. of America, Franklin Park, Ill., has started commercial production of shell-mold castings. They will be marketed under the name Die Mold Castings.

* * *

Steiner-Ives Co., Newark, N. J., manufacturer of industrial ovens and heat-treating equipment, is building a new plant at Union, N. J. It will move there late this summer.

Book Review

Corrosion Testing Procedures, by F. A. Champion, cloth, 369 pages, 6 x 9 in., published by John Wiley & Sons Inc., New York. Price $6.25.

As the title indicates, this book is designed primarily for persons concerned with practical problems in the corrosion of metals in service or the production of metal of adequate corrosion resistance. The author has not only covered in detail the various types of testing procedures and the problems relating to each, but he has also appended, as the final chapter, a section on the "Expression and Interpretation of Results."

The material is from a great many persons and places, and an author index helps one to locate them just as a subject index makes general use of the book more easy. A list of references is attached to each chapter, also, and there are a great many graphs, tables, and other diagrams.

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They help prevent costly accidents. • They withstand gasolines, oils, greases, and corrosive chemicals such as sulphuric, chromic, and muriatic acids, caustic and plating solutions. • The rough-surface fingers assure positive easy gripping. • They're comfortable because the curved finger construction conforms to the natural curve of hand, eliminates straining and pulling. Highly flexible, they permit easy, natural working motions. These "U. S." gloves withstand tough service. Full range of sizes, lengths and weights. "U. S." technical men will be glad to analyze your glove needs and recommend the correct glove for *your* job.

U. S. INDUSTRIAL GLOVES

UNITED STATES RUBBER COMPANY

when it comes to EASY PEELING you can't beat IRONTON BERLITE FOR ALL LADLE LININGS

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IN every foundry, the job of repairing ladles is an expensive time-and-money factor. That's why it will make a difference in your shop when **BERLITE** . . . Ironton's special-purpose refractory material . . . is used to line hand, bull, and transfer ladles. ***IRONTON* BERLITE** linings make is easy to clean cold metal and slag without destroying the ladle lining. Slag and metal will not stick to **BERLITE** linings, so costly hours are cut from ladle repairs. You'll find ***IRONTON* BERLITE** has unusually high refractoriness, excellent workability as mortar, mud or ramming material, high strength, exceptional resistance to slag and metal erosion . . . and it won't shrink, bloat, or peel off from the ladle lining. Call Ironton's representative in the city nearest you for an on-the-spot demonstration.

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Not only that, but it delivers the castings at a lower cost per piece.

Foundries all over the country depend upon Holcroft to give them the furnace help they need. That's because Holcroft is such a well-known leader in the field. Many foundry practices, standard procedure today, were basic ideas worked out by Holcroft engineers.

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Paris 8, France

Core Is Gate and Riser

(*Concluded from page 97*)

There are almost innumerable ways in which the gate-riser cores can be used to advantage. After steady use of them for over two years, we are still finding new methods of application. In the writer's foundry, approximately 80 per cent of the castings are gated and poured in this manner. Experience indicates that superior results are obtained when the iron is poured quite hot—between 2700 and 2800° F.

With the conventional type riser on a heavy section, there is always an open grain structure in the casting under the riser, caused by the formation of a hot spot at the junction area. The small connecting necks of the gate-riser completely eliminate this condition. The iron is homogeneous throughout.

Application of one of the smaller cores is shown in Fig. 4. This holds just 10 lb of metal and has proved very effective for bench work. The pouring holes in this core are somewhat smaller than the corresponding holes in the larger sizes. In shallow copes, where the cores have little contact with the molding sand, grooves may be filed in the outside face to give the cores a grip and thus prevent the metal from pushing them upward. In some instances it is necessary to place a broken clamp or other small weight across the top of the core.

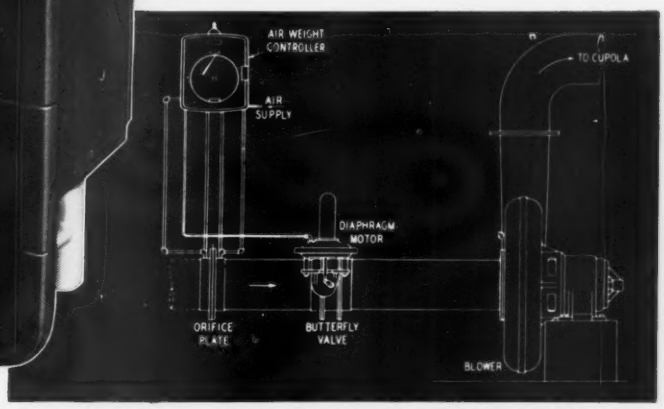
The gate-riser core serves as a satisfactory runner box for pouring metal into open sand molds. The core is pasted on a piece of slab core with one large opening or with openings corresponding to the gate openings in the gate-riser core. The suitably mounted assembly is placed over the area selected to receive the metal. A small weight holds it in place while the metal is flowing through.

The gate-riser system has been used experimentally on brass and aluminum castings with varying results. Considerable study and trial will be required before definite results will be known. However, the prospect is encouraging.

Western Metal Congress

The Eighth Western Metal Congress and Exposition will be held March 23-27, 1953, in the Pan-Pacific Auditorium, Los Angeles. It will be sponsored by the American Society for Metals in co-operation with western divisions of 20 national technical societies.

Simplest Efficiency-Booster you ever saw!



Typical installation of Foxboro Air Weight Control . . . readily adaptable to either a centrifugal blower (shown in diagram) or a positive displacement blower.

Controlling cupola blast by **weight of air** cuts pigging, ups quality, gives uniform pours

There's no longer any need to let the weather upset your cupola operation. With a Foxboro Air Weight Controller you can get uniform pours, *every day.*

The Foxboro Air Weight Controller automatically and precisely controls cupola air blast by weight — delivers the correct amount of oxygen for the quantity of coke in the charge. Regardless of ups and downs in atmospheric pressure or temperature, this simple, inexpensive accessory compensates for every change—insures better combustion, more uniform heats, and saves pigging.

All you do is set the control pointer before you start the run. No further attention is necessary. Air weight is held constant as long as desired, or may be changed instantly for pours of different composition. Installation on your present blowers easily made by an experienced pipefitter.

Foxboro Air Weight Controllers are used by more than 1000 foundries. Write for Application Engineering Data Sheet 330-6, and Bulletin 268-3. The Foxboro Company, 329 Neponset Ave., Foxboro, Mass., U.S.A.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

FACTORIES IN THE UNITED STATES, CANADA AND ENGLAND

Adventures of BILL

By PAT DWYER

Illustrations by RICHEY

WHEN Bill came in the other night he found me perched on two chairs with a typewriter reposing gracefully on my knees. I had started some time before to write a letter, but owing to interruptions of one kind or another I had not made much progress. My thoughts strayed enviously to the peace and quietness enjoyed by hermits and-er-people of that kind who live in huts or caves in the mountain side and who never have to either read or write letters. What could be sweeter than to creep into a cozy den about the first of November and hibernate there until the buds began to unroll in the spring and the trumpeting wild geese in V-formation sailed high overhead on their way to the Arctic circle?

Under these conditions, and if driven to it, I felt reasonably sure I could write some nice friendly chatty letters. The main—in fact, the only objection—to the idea is that all these cheery little retreats are located in such dashed outlandish and inaccessible places that mail cannot be either collected or delivered. On mature second thought I was forced to the conclusion that while one of these cute little hidie holes on a mountain side presents certain advantages, still, taking it by and large, it is not such a much as a writing den.

"Go ahead," Bill remarked kindly. "Finish that thing. I wish I could run one of them there things—dash off a letter in a couple of minutes."

"You're an optimist," I replied. "I have been sitting here for the past half hour and as you can see for yourself I have not set down anything but the address, the date and the usual salutation."

"Half an hour!" Bill exclaimed in mock consternation. "Slow 'er down kid. Slow 'er down. The first thing you know you will have the babbitt dripping out of the bearings and burning large painful holes in both your legs. While we are on the subject I wish you would satisfy my curiosity on just one point."

"Only one?" I inquired. "Why the sudden modesty? Usually you can ask more questions in five minutes than a strong man, nay, two strong men, could answer in a week. Fire ahead me hearty, only re-mem-bah I reserve to myself the inalienable right to tell you the truth—and as little of the truth as I see fit."

"Half the truth is all I expect. However, half the truth is better than a rolling stone, or a bite from the dog in the manger. What I want to know, how long does it take you to write one of these articles, or stories or essays, or whatever they are, that appear in FOUNDRY every once in a while."

"Well" I hedged cautiously "It all depends."

"Depends on what?"

"Depends on circumstances. Sometimes—"

"What have circumstances to do with it? They're all alike, ain't they? F'instance you show me a pattern that goes into a 4x4 ft flask and I can tell you the approximate molding time on the job. If you have to write enough tripe to fill a couple of pages, can't you tell me how long it takes you to do it?"

"Your comparison," I said "shows to what depths of dumbness the human mind can descend when it slips from its little familiar paths. Your reference to tripe is in doubtful taste. Apparently you have forgotten the time we were stranded in South Chicago and you were glad to fill yourself with—"

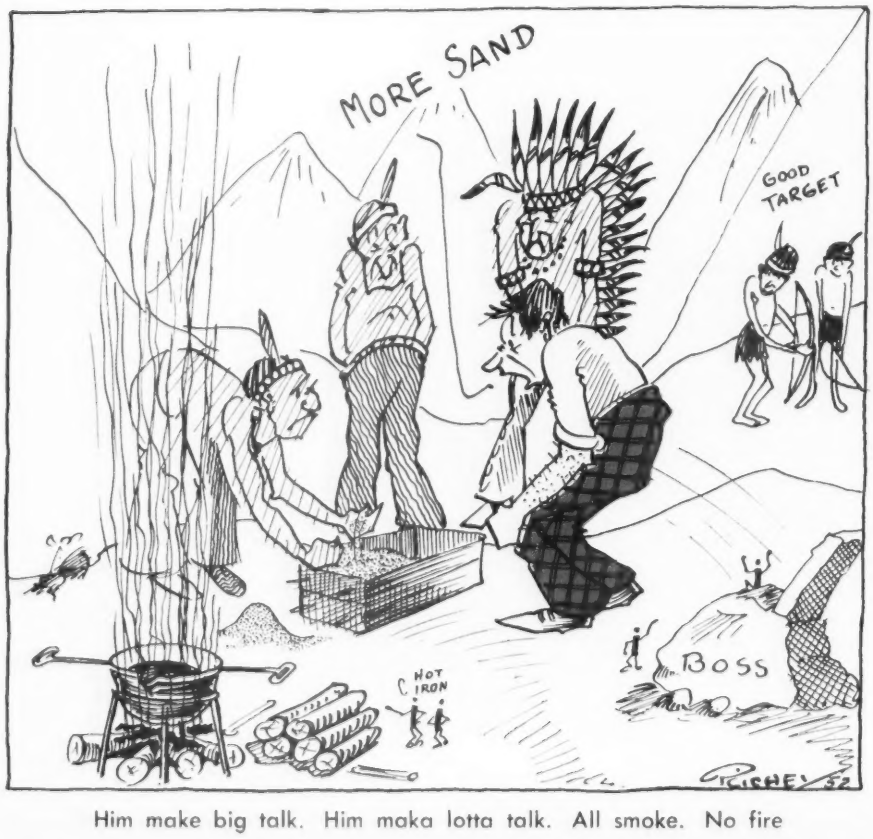
"Old Stuff," Bill said "Old stuff. Forget it. If I remember correctly you were not lurking behind the door on that painful occasion—or on any other similar occasion when stern necessity sharpened our wits and noses on a foraging patrol. However, that's neither here nor there, as the apprentice said when he tried to pour metal down two sprues and found that both were dummies. I am not going to pine away to a shadow if you never answer my question, but I certainly hate this quibbling and beating about the bush. My own private opinion is that you dawdle along for days at a time and are ashamed to admit it. How's that for a shot in the dark?"

"It is about as accurate," I remarked coldly, "as the usual shot in the dark, or the average opinion offered by any nosey individual on a subject of which he is profoundly ignorant. Just to show you to what extent circumstances enter into the problem, I could tell you of one story on which I worked for nearly a year."

"A year!" Bill cried incredulously. "I guess that must have been an off year. That story must have been in an advanced stage of putrefaction by the time you finished it."

"That shot is nearer the mark than

(*Continued on page* 241)



Him make big talk. Him maka lotta talk. All smoke. No fire

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Always break in new or freshly cleaned shell mold patterns with Dow Corning 7 Compound. Simply rub it on and heat the pattern briefly. Deep-section or highly complex plates may require a second or third treatment. The most effective parting agent known for shell molding, Dow Corning 7 Compound forms a continuous, semi-permanent coating which conditions the pattern and helps assure clean, easy release and smooth, uninterrupted production of even the most intricate shells.

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Speed production by spraying every cycle with Dow Corning 7 Emulsion. Easier and safer to apply than solvent dispersions of the Compound, the Emulsion may be diluted with water to any desired working concentration. Formulated especially for the shell process, it is non-corrosive to metals and leaves minimum build-up. With only occasional agitation, it is sufficiently stable after dilution to allow a day's supply to be made up in advance.

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1927 SILVER 25th ANNIVERSARY 1952

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(*Continued from page* 238)

your first one," I admitted. "At the close of the year I abandoned work on the thing and buried it."

"Fine work," Bill agreed. "You should do it more frequently. If you would take a friend's advice—"

"Keep it," I said, "and apply it nearer home. You ask me a totally unprovoked question. The answer to this question will not benefit you to any extent. You admit it was prompted by idle and impudent curiosity. Therefore, I should be perfectly justified in answering it by telling you to go wash your neck. Instead of taking this obvious course I start to give you an explanation and what do you do? You introduce all kind of irrelevant material. Lay off for a minute and listen. One day in the merry month of May a little old hobo molder came in to see me. He said his name was Bob Stewart—"

"I know him," Bill interrupted. "Served his time in Skowhegan. The first time I ran across him was in Butte—"

"He told me he knew you," I said, "but that has nothing to do with the story. Hey, listen a minute, can't you? This lad remained about an hour and we had an extremely interesting session. In a cruising period of nearly forty years, he had worked all over the country. Due to the introduction of molding machines and one thing and another, the lure of the open road had lost a great deal of its one-time appeal.

"According to the genial Mr. Stewart, you never run into none of the old gang no more. Most of the shops is filled wit' machines run by monkeys what never served no time and who is no more molder than he is a hottentot wit' pink garters. The moldin' trade is shot to pieces so far as an old-time all-around molder is concerned. He for one is thinkin' seriously of chuckin' it for a job as a night watchman, or a janitor, or a member of the white wing brigade.

"Contrasting present day conditions with those prevailing in the good old days, he told me of an experience several years ago when he accepted a job with a mining company to go to a foreign country to organize, equip and run a foundry. He had to start from absolute zero and break in a bunch of natives. He had to prospect the territory and select sand for molds and cores and then had to show his disciples how to mix and use the sand.

"'Believe me kid,' he said, 'that was no pink tea job. At times I felt like that there guy Robinson Crusoe trying to make a suit and an umbrella out of goat skins. I was the whole thing with no one to appeal to

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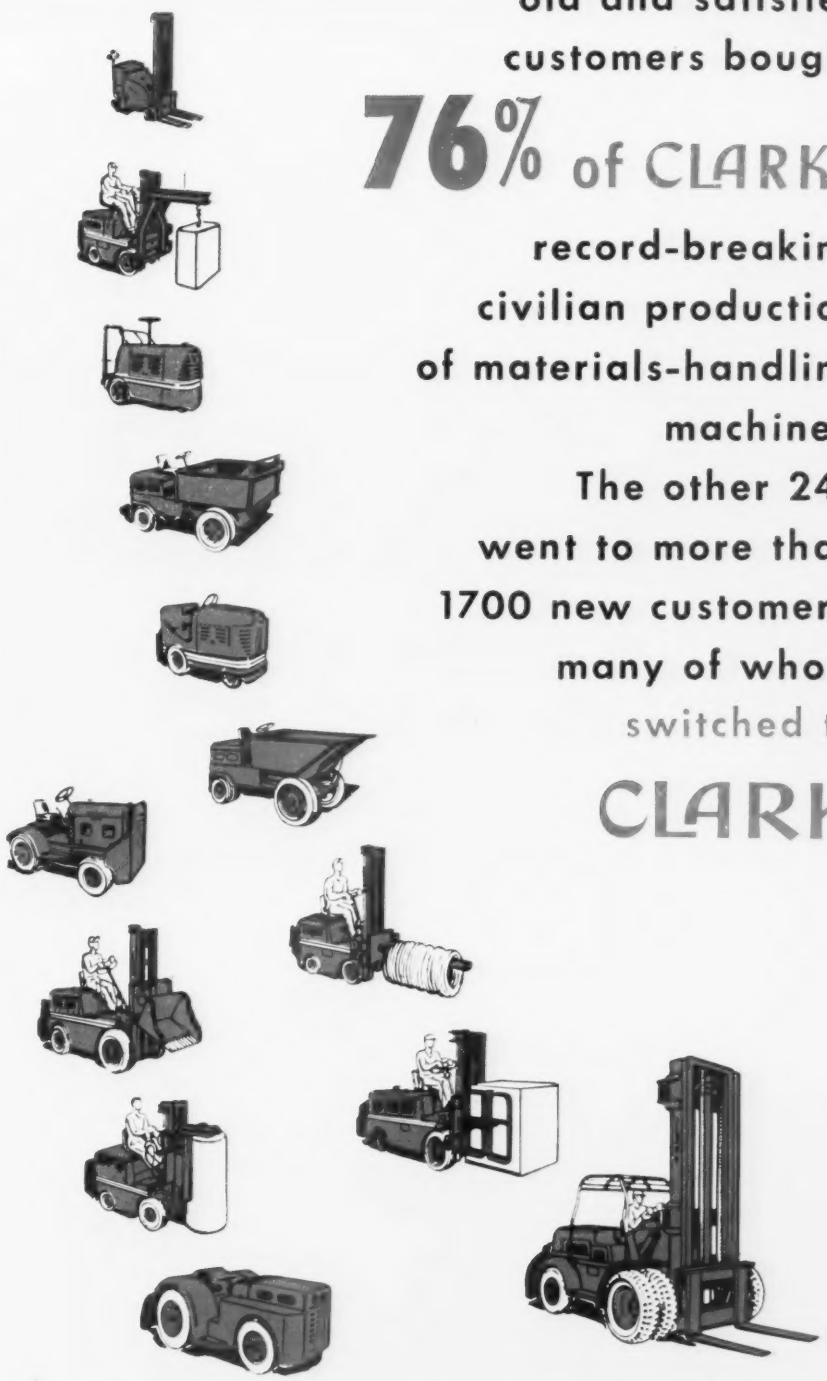

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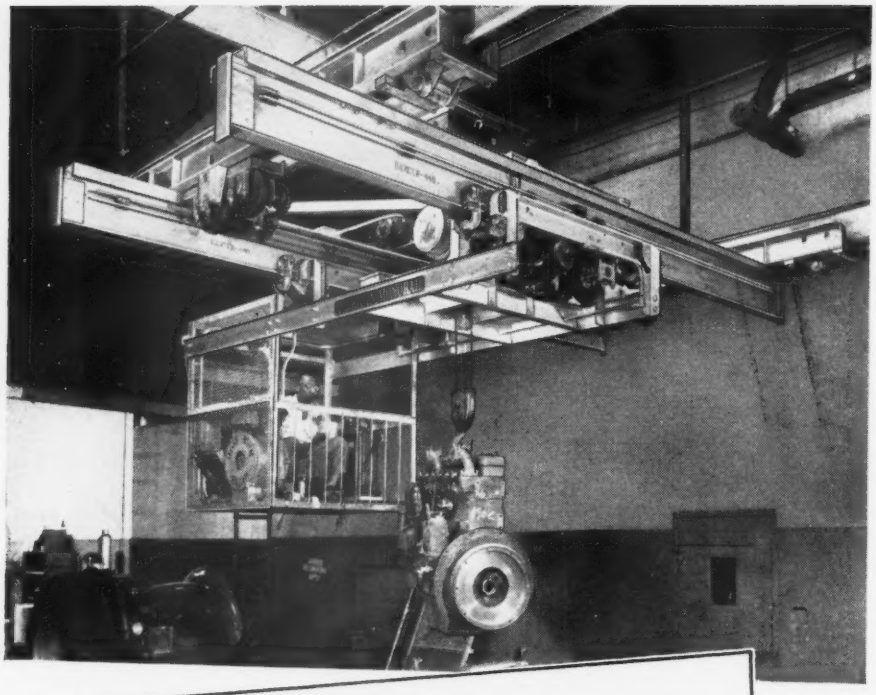

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CONSTANT SERVICE at HIGH SPEED

If your handling operations must be "on the go—all the time—and fast" then investigate this American MonoRail Crane. With constant service at high speed, it offers the advantages of rugged construction, low-cost operation and quick installation.

The big reason is articulated trolleys. Each trolley wheel carries its share of the load in perfect alignment with the craneway tracks. All possible friction is eliminated. The result is perfectly articulated trolley travel. Articulated trolleys permit operating speeds of 500 feet per minute under constant service.

SEND FOR BULLETIN C-1

THE AMERICAN MONORAIL COMPANY

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for advice or assistance. However, I made the thing go. When I left at the end of my three-year contract, I had as sweet a running little shop as you could find in this here now United States. I don't want to butt in,' Mr. Stewart concluded magnanimously, 'but couldn't you write a piece about that in FOUNDRY?'"

"I thanked him for this noble suggestion and assured him I would get going on the job immediately. A few days later while turning the story around in my mind, I decided I needed further detail. Unfortunately, Mr. Stewart had vanished. I never have heard of or from him from that day to this. I inquired here and there now and again for about a year and then gave up the idea of writing a chapter under the title *Robinson Crusoe in Peru.*"

"I regret," Bill said, "that in recent years I have lost the trail of the Skowhegan Skimmer, but if you are looking for story material I can give you some dope based on an inquiry from a man who wrote that he had orders for a considerable quantity of soil pipe castings, straight lengths and fittings, elbows, T's, Y's, etc. He would appreciate information on how to make equipment for producing green sand cores. For a last item he wanted to know if he could pour the castings with hard iron."

"Why did he want to pour the castings with hard iron?"

"He did not take me into his confidence on that point. Maybe his customer was a hard man to please. In my reply I pointed out that the manufacture of soil pipe, straight lengths and fittings is a highly specialized branch of the foundry business. Equipment for making the castings must be extremely rigid and accurate. Therefore, the expense involved is justified only by large-scale operation. Competition is another important factor.

"A complete description of the manufacture of soil pipe castings would fill a book. Briefly it may be summarized as follows: The long straight lengths in either one or two bell ends are made in close fitting cast iron or steel flasks. In some plants the metal is poured *four-up* from hand ladles. In other plants the sprues and gates are arranged to take metal from a large multi-lip ladle suspended from a crane or monorail.

"Practice in preparing the long molds varies to some extent. In some plants the pattern is dropped part way through a stripping plate before the half mold is lifted. In others the half flask is lifted directly from the rigid pattern and plate. A small

(*Continued on page* 245)

"FOUNDROMATIC" SHAKEOUTS

Heavy body of structural and plate steel is completely stress relieved before machining. Heavy cast steel snubbers keep body centered on durable coil support springs even if side loaded. Pivoted motor base design, coordinated with *Texrope* drive, provides trouble-free operation.

Slash Knockout Time!

PRODUCTION WAS SPEEDED 96-FOLD at this mid-western steel foundry when the *Foundromatic* shakeout shown was installed! Crane bases are cored out completely in about *five minutes* . . . as compared with an average of *eight hours* required with manual labor.

The *Foundromatic* shakeout, an exclusive and field-proven Allis-Chalmers design, will also radically reduce *your* foundry shakeout and core knockout time. You'll get increased output for these three reasons:

1 FASTER SHAKING OUT. Heavy body construction, with decks of 1½ to 2 in. plate steel, gives more "punch" to full load operation.

2 MORE FLOOR SPACE. Shakeout can break up molds as soon as castings are cool, leaving floor area free for re-use.

3 UNINTERRUPTED OPERATION. Rugged two-bearing vibrating mechanism has oversize bearings carrying only eccentric shaft force. And there is no record of shafts or support springs ever breaking.

Get the full story on *Foundromatic* shakeouts, their proven construction features, and how they can benefit *your* foundry operations. Single units built in capacities from one to 25 tons . . . multiple units available to over 100 tons. Call your nearest A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletins 07B7532 and 07B6365A.

A-3612

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

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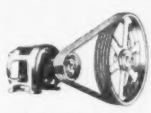
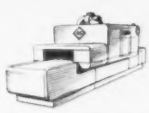
Foundry Equipment for Bigger Output—Better Working Conditions!

Vibrating Screens

Cupola Blowers

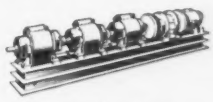


Motors-Drives Control



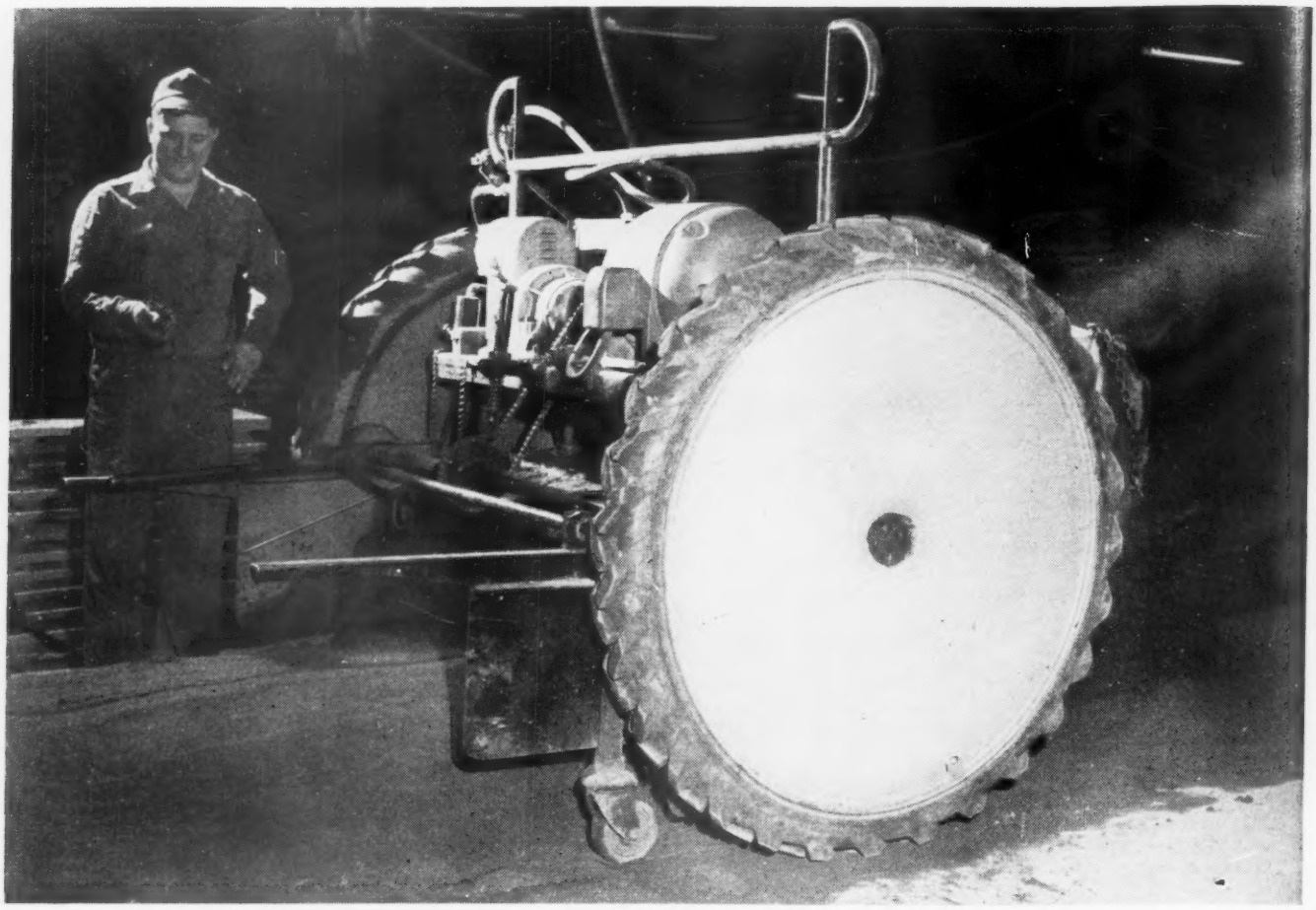
Foundromatic Core Dryer

Induction Heating & Melting



Regulex Arc Furnace Control

IN TUNE WITH THE TIMES WITH *"The Moulders' Friend"*



Costs rise higher and higher every year. To keep in tune with the times we must find cheaper ways to do the job better.

Foundrymen who use The Moulders' Friend sand conditioner agree that the thousands of flat tempered steel wires in the brush revolving at high speed do the most thorough job of mixing and aerating sand heaps on the foundry floor.

The Moulders' Friend is completely self-propelled. It has a capacity of two tons of thoroughly conditioned sand per minute with travel speeds up to 50 feet per minute. One man does the job.

A screen for removing trash and tramp iron and a water dispenser for accurately wetting down the sand as the machine travels over the heap are valuable added features.

The Moulders' Friend fits your foundry. Being carried on two large wheels it turns short and handles well in the crowded foundry.

The Moulders' Friend will help you keep in tune with the times by paying for itself with better castings and less labor cost. Investigate this remarkable machine today. See one in operation.

THE BRUSH DOES THE JOB

"The Moulders' Friend" ● Dallas City, Illinois

(*Continued from page* 242)

fillet at the joint line of the pattern insures a clean lift. A vibrator attached to the plate is kept in motion during the lift. For many years, and up to the present, the usual type of arbor is a cast iron barrel. Recently in some plants sections of heavy steel tubes have been introduced. Rows of small vent holes closely spaced except in line with the gates, provide exit for gas and steam. The amount is not excessive from the comparatively thin coating of sand on the arbor. The machined arbor ends fit closely in a circular opening in each end of the flask.

"Finely screened sand for the cores is stored in an overhead hopper, constantly replenished by a bucket elevator running in close proximity to a revolving screen on the floor. The arbors are claywashed or, in some instances, simply dipped in a water tank, and placed one or two at a time on a stand provided with bearings corresponding to the turned ends of the arbors. A crank handle for hand work, or a simple type of clutch for mechanical handling, is fitted to one end to revolve the arbor while a thin stream of sand falls from the overhead hopper. A flat gage board faced with steel, resting on the stand, regulates the thickness of sand on the arbor and imparts the correct shape and smoothness. The cores are ont coated.

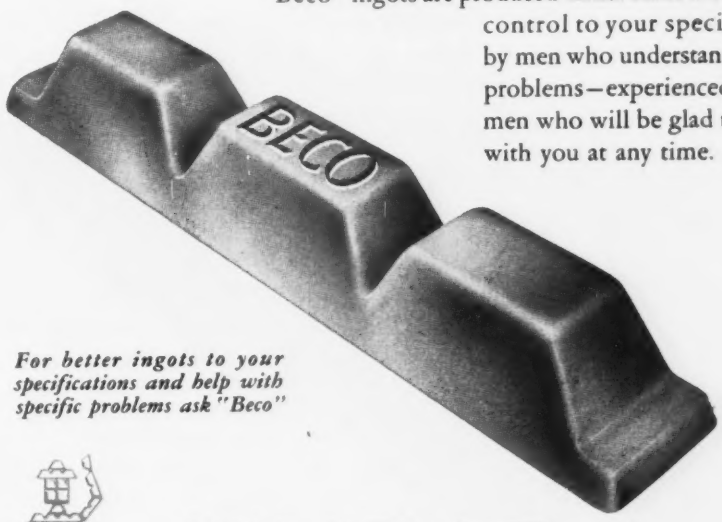
"In some foreign installations it is claimed that dried loam cores are employed. Where the iron is not up to specification in composition and temperature, the discount may be heavy if green sand cores are employed. Dried cores practically eliminate this hazard. The claim is advanced that the increased number of good castings more than offsets the drying cost. So far as I know, in all American foundries soil pipe castings are made with green sand molds and cores.

"In a general way it may be said that molds for the pipe fittings are made in the same manner as the molds for the straight lengths—on a jolt machine or rammed by hand. All cores are rammed by hand. The arbor which may be plain, or a backbone with a number of semicircular wings cast on, occupies space in the lower half of the corebox. The corebox is in halves which may or may not be hinged. For some shapes a shell pattern serves for pattern and corebox. The pattern is split horizontally through the center. On cores provided with three or more bearing points, short core prints are sufficient. On bent pipes with only two bearing

(*Concluded on page* 247)

BECO ALUMINUM

To produce the best in aluminum castings try "Beco" Aluminum Alloy ingots, produced under conditions most favorable to your requirements. "Beco" ingots are produced under strict metallurgical control to your specifications by men who understand foundry problems—experienced foundrymen who will be glad to consult with you at any time.



For better ingots to your specifications and help with specific problems ask "Beco"

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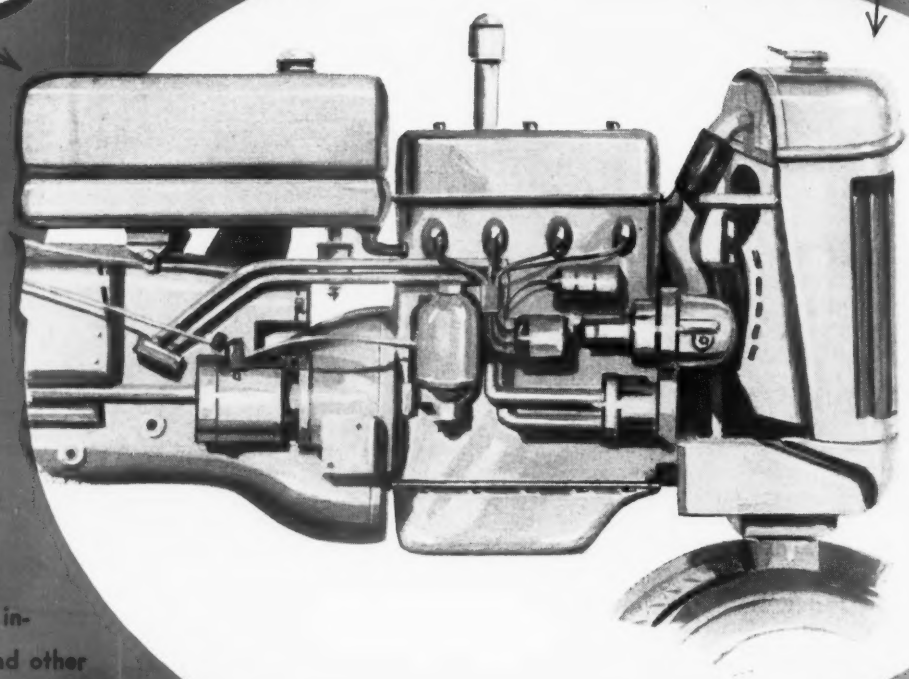
Why waste time and money waiting for pattern equipment? Save all around with TAMASTONE! Foundries everywhere report big savings in time and labor! . . . some increase production 400% others 600% and up! TAMASTONE cope and drag patterns or match plates can be made in your foundry by your own molder. No accelerators, retarders, vehicles and no special experience needed! Why not talk this over with your foundry superintendent!

Why don't you *try* Super Tamastone?

TAMMS INDUSTRIES, INC.

228 N. La Salle St., Chicago 1, Ill.

Protection by TOUSEY!



TOUSEY Casting Sealers are used to protect the interior of motors, gear cases and other parts of the tractor against various forms of abuse, and to provide a non-bleeding base for finish coats to the exterior. Tousey has been supplying such sealers to the Farm Equipment Field for almost 70 years. ★ The quality and uniformity of Tousey finishes plus high standards in production is another form of protection that has been in effect during this same period, helping to make countless new friends and customers. Your inquiries are invited.

TOUSEY PRODUCTS

CASTING SEALER

THE TOUSEY VARNISH COMPANY

520 WEST 25TH STREET • CHICAGO 16, ILLINOIS

(*Concluded from page* 245)

points it is necessary to prolong the bearings and arbor ends to resist the *lift* of the metal as it flows into the mold.

"So far as the utility of the castings is concerned, it makes no difference whether they are hard or soft iron. However, since hard iron has not the fluidity or running qualities necessary to pour castings of such area and thin section as soil pipe, it automatically is ruled out. A high-phosphorus pig iron mixed with light machinery or clean stove plate scrap —approximately 40 per cent pig iron and 60 per cent scrap—is satisfactory for these castings."

University Revises Films On Motion Study

Revised editions of "Motion Study Principles" and "Motion Study Application," two of its most important sound films, have just been released by the Bureau of Audio-Visual Instruction of the State University of Iowa. "Motion Study Principles" has a showing time of 28 minutes. Its purpose is to present some of the most important principles of motion economy and to illustrate how these principles may be applied to specific operations.

"Motion Study Applications" has a showing time of 18 minutes. It defines the most common hand motions and shows how an understanding of this classification and a knowledge of motion study principles enable one to develop better and easier ways to work. These films are available on either a rental or a purchase basis from the State University of Iowa, Bureau of Audio-Visual Instruction, Iowa City, Iowa.

Instrument Conference and Exhibit

Seventh annual Instrument Conference and Exhibit, sponsored by the Instrument Society of America, will be held in Cleveland at Public Auditorium Sept. 8 to 12. Co-operating organizations include American Institute of Physics, American Society of Mechanical Engineers, American Institute of Electrical Engineers, Institute of Radio Engineers, Cleveland Physics Society and Scientific Apparatus Makers Association. During the week over 30 technical sessions will be held with more than 100 scientists and specialists participating. At the exhibit over 260 booths will display instruments and allied equipment.

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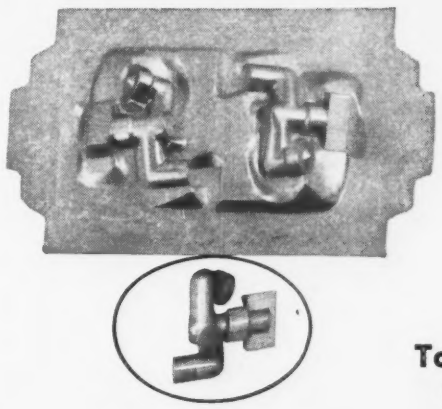
with PRESSURE-CAST ALUMINUM
MATCHPLATES and COPE & DRAG PLATES



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New EQUIPMENT and Supplies

For Additional Information on these Items Use Reply Card—Page 251

(1)—Moisture Measurement: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—A new device makes it possible to determine in 30 seconds by direct drying and weighing how much moisture is in foundry sand and a wide variety of other granular or fibrous materials. The sample is dried in 10 to 15 seconds by a fast-moving stream of thermostatically controlled hot air. A sample of any size from 10 to 35 grams is automatically weighed by a built-in electronic balance which also indicates the moisture loss in percentage after drying without any balancing operation.

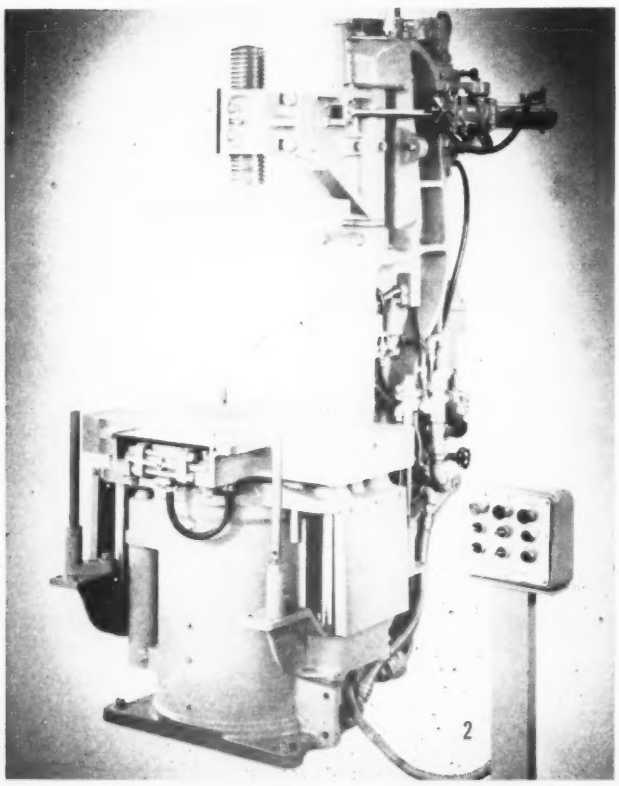
1

For more Details Circle No. 1—Page 251

(2)—Molding Machine: SPO Inc., 6448 Grand Division Ave., Cleveland 25—Pushbutton type electrical controls govern all operations and provide for either fully automatic or selective manual control of a new jolt-squeeze-strip/draw machine. Once the machine is set up, the operator pushes only two buttons to actuate a complete molding cycle. All operations are automatically controlled by means of solenoid valves. Jolting action is timer-controlled, and the squeeze is regulated by a pressure switch. Stripping action also is controlled automatically to eliminate dependence on the operator's judgment. The machine's stripping pins are adjustable to accommodate a range of flask sizes. Squeeze capacity is 16,000 lb and jolt capacity is 1500 lb on standard 80 psi line pressure. Pattern draw is 10 in. and maximum squeeze stroke is 12 in. Flask space ranges from 19 to 31 in., left to right, and from 16 to 13 in., front to back. The machine is equipped with an air vibrator, automatic air line lubricator and an "inverted jolt" mechanism.

For More Details Circle No. 2—Page 251

(3)—Aerator: National Engineering Co., 549 W. Washington Blvd., Chicago 6—An improved sand aerator offers the following advantages over the company's old model: Sand of equal or better quality; discharge time as fast as the mixer discharge—a one-third to one-half reduction in required discharge time;



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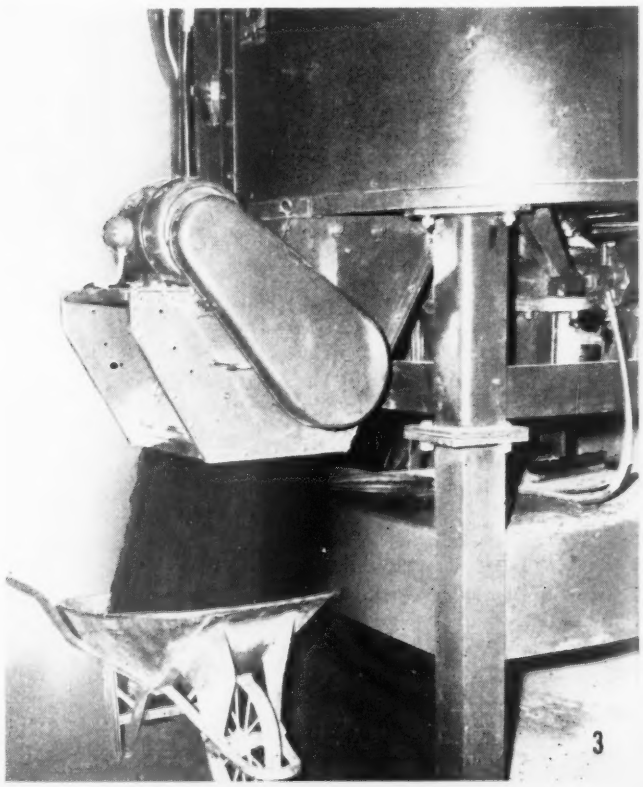

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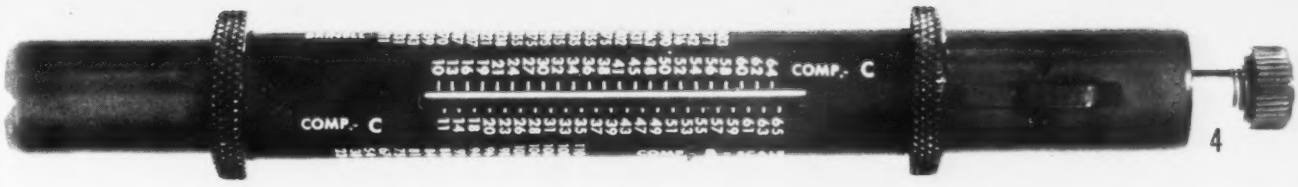


doubled rotor service life; a 30 to 50 per cent reduction in horsepower required—no slowdown during peak discharge periods; no buildup of sand in new rotor assembly. The aerator operates by gently combing and fluffing the sand, eliminating the necessity of riddling it against the patterns. Speed of operation is sufficiently low to prevent any stripping of bond from the sand grains, yet the rate of discharge is no less then it would be without the aerator. The unit is attached directly to the mixer discharge and consists of a drum shaft mounted on sealed, self-aligning, anti-friction bearings. It is available in capacities of 30 to 150 tons per hour.

For More Details Circle No. 3—Page 251

(4)—Hardness Tester: Peabody Industries, Inc., 1819 Broadway, New York 23—Pocket-size metal hardness tester, weighing only 7 oz, makes possible testing of internal mold and die sections with an area as small as 1 sq in. It checks hardness by rebound rather than by penetration. For calibration and for use with parts weighing less than 15 lb, a clamping anvil is supplied to provide sufficient mass to obtain the full rebound. The operator extends the spindle to its full height, depresses the trigger, allows it to rebound to where it stops and is held automatically, and reads the hardness directly from the calibrated scales on the tester. Direct readings are obtained on any of three different Rockwell and brinell scales without use of conversion charts. There are two models, one for steel and the other for nonferrous metal surfaces.

For More Details Circle No. 4—Page 251

Slurry Coating: Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19—Slurry coating made with a powder obtained from the insoluble residue resulting from the digestion of bauxite in the Bayer process of making alumina is used to minimize iron pick-up in melting, alloying and casting aluminum. Slurry consists of 2 to 4 lb of powder, ¼ to ½ pint sodium silicate and 1 gal water. Mixture is heated and applied by spraying, dipping or brushing to molds, ladles, melting pots, pouring troughs, tools used for mixing, alloying and cleaning, and to any other ferrous metal equipment which comes into contact with molten aluminum. The metal parts to be coated are cleaned and the surfaces roughened, then heated to between 200 and 400° F before the slurry is applied.

For More Details Circle No. 5—Page 251

Shell Molding: Monsanto Chemical Co., Springfield 2, Mass.—Four new plastic products have been developed by the company. Two fast-curing, fast-coating phenolic resins for use in shell molding are said to permit faster cycles in casting operations and have been tested and evaluated in foundry trials. A urea core binder, combining good baking rates with high bonding efficiency and freedom from odors, is a free-flowing dry powder, essentially free from ash and skin irritants. The fourth product, a dust suppressant, reduces dust problems in connection with the shell molding process. Classified as a nontoxic, mobile fluid of medium viscosity, the dust suppressant is reported to accomplish its purpose without changing significant characteristics of the shell mold resin-sand mix. It reduces tendency of resin to segregate in the mix.

For More Details Circle No. 6—Page 251

Truck Attachments: Towmotor Corp., 1226 East 152nd St., Cleveland 10—Fork extensions for handling unusually long loads are fitted over regular forks where they lock into place. They may be added or removed quickly. Side shifter, engineered to operate with standard forks, has lateral travel of 3½-in. to either side of center. This simplifies placing loads tightly against walls, and eliminates excessive maneuvering in areas where repositioning the fork truck is difficult. Overhead guard, constructed of 1½-in. and 2-in. steel pipe, offers protection for truck operators in high stacking work.

For More Details Circle No. 7—Page 251

Furnace: Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich.—Redesigned electric melting furnace for education and experimental use and small production is designed to produce quality melts of alloy irons, tool steel and stainless steel. It has a new rocking controller, which makes the furnace more completely adjustable in operation. A three-phase reversible motor for furnace rocking and tilting has replaced the single-phase motor formerly used. Electrode brackets are mounted independently of the shell to allow easier, faster shell replacement and to minimize wear on the flexible electrical leads. Furnace is furnished complete with transformer, ready for installation.

For More Details Circle No. 8—Page 251

Zircon Sand: Foote Mineral Co., 18 West Chelten Ave., Philadelphia 44—Zircon sand, now being offered by this company, can help avoid "burn-in," reduce cleaning costs on castings and minimize shrinkage stresses. Its grain size, chemical inertness and high rate of heat diffusion are the sources of its effectiveness.

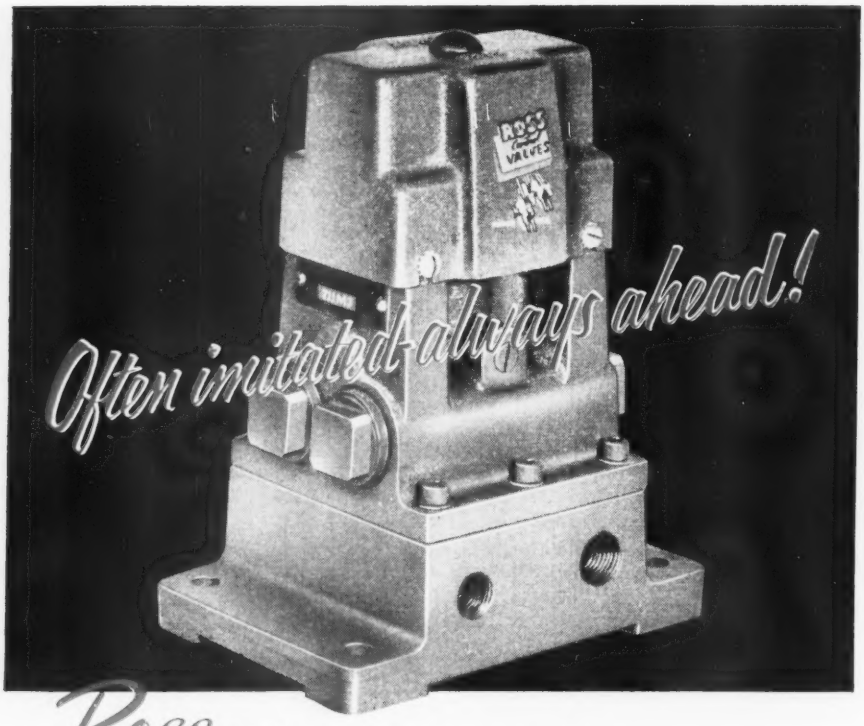
For More Details Circle No. 9—Page 251

Storage Battery: Electric Storage Battery Co., P.O. Box 8109, Philadelphia 1—Improved industrial storage battery utilizes a new silver alloy positive-plate grid made up of metal core rods inserted in slotted hard rubber tubes. Active material is packed into the tubes surrounding the rods and the tubes sealed with plugs incorporated in a single bar of polyethylene. Other improvements are a new homogeneous sealing compound; a seamless shockproof jar; unbreakable plastic vent plugs, and a corrosion and impact resistant plastic steel tray coating. Life of the new battery is said to exceed that of previous models.

For More Details Circle No. 10—Page 251

Protective Creams: West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.—Antiseptic protective creams, containing hexachlorophene, provide a zone of inhibition against staphylococcus aureus and are so formulated as to be almost neutral in pH, thus assuring against irritations from free acids or alkalis. Three types include: An oil resistant, water soluble bland vanishing cream for protection against dust borne irritants, viscous oils, dirts, greases and grimes; a water resistant soft cold cream for protection against dilute acids and alkalis, and a solvent resistant water soluble

IF IT'S A VALVE FOR FOUNDRY WORK— ROSS HAS IT



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bland vanishing cream for protection against organic solvents, acetates and cooling and cutting oils of low water content. A polystyrene dispenser, also offered, is designed to dispense a predetermined amount of protective cream with each stroke of the lever.

For More Details Circle No. 11—Page 251

Goggle: American Optical Co., Southbridge, Mass.—Safety goggle features a transparent plastic frame

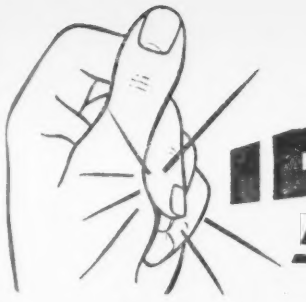
which provides a wide field of vision. It is designed and recommended for wear directly over the eyes or over spectacles and is particularly useful for frontal protection against foreign particles.

For More Details Circle No. 12—Page 251

Reflector Lamp: Sylvania Electric Products Inc., Salem, Mass.—High-bay reflector lamps rated at 500 or 750 watts have been added to the company's line of built-in reflector lamps for industrial use. The new incandescent lamps have a rated average life of 2000 hours. They have

a mogul base and are designed for base-up or within 25 degrees of vertically base-up burning positions. The new units have a maximum overall length of 11¾ in. and operate at 115, 120 and 125 volts. Designed for

(*Continued on page* 254)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

50. Blowers & Exhausters

Buffalo Forge Co.—Where constant air pressures in volumes up to 5500 cfm are required for oil or gas furnaces, cupola work, gas boosting or any other such service, type E and RE electric blowers will do the job. For a blow-by-blow description of these units along with tabulated capacities, static pressures, specs and line drawings, get 8-page bulletin 3014-D.

51. Engineering Cast Irons

International Nickel Co.—28-page reference bulletin "Guide to the Selection of Engineering Irons" contains 27 tables, charts and photomicrographs to show how, through use of nickel alone or in combination with other alloying elements, the engineering properties of cast iron can be controlled to meet almost any reasonable combination of service requirements.

52. Arc Welding Equipment

Harnischfeger Corp.—"Everything for Arc Welding" is just what is covered in 20-page pocket size booklet of the same name. Contents describe and illustrate various type ac and dc arc welders, welding generators, welding positioners, welding control systems, arc torches, arc welding accessories and welding electrodes.

53. Handling Equipment

Webster Mfg., Inc.—One Webster had a lot to do with words, but this Webster uses some of them to describe the company's various materials handling devices for moving many bulk materials, including coal, scrap, chemicals and sand. The company's facilities are covered in detail. It has 32 pages of facts and pictures.

54. Tellurium in Chill Control

American Smelting & Refining Co. —Want to give your cast iron the chills? Then get 16-page booklet "Tellurium in Chill Control." It reprints two FOUNDRY articles entitled "Structural Aspects of Tellurium and Graphite Additions for Chill Control in Cast Iron," by E. A. Loria and "Use of Tellurium in Promoting Chills on Gray Iron Castings," by Dr. C. R. Austin.

55. Foundry Dust Control

Claude B. Schneible Co. — Every foundry dust-creating operation can be controlled by a Schneible dust collecting and ventilating system, according to 28-page bulletin 47. Booklet contains perspective drawings and photos of systems for all departments, and describes function of the Uni-Flo hood, Multi-Wash collector, dewatering tanks, skimmer type settling tanks and the Velocitrap.

56. Electrical Products

Ideal Industries, Inc.—Here's a catalog what am! It has 66 pages of descriptions, photos and specifications of electrical and machinery products. Can't begin to list everything in it, but you'll not want to pass it up. Just send for form No. X-1.

57. Abrasive Disc Wheels

Besly-Welles Corp. — Besly-Titan resinoid bonded abrasive discs and wheels might just as well be the "bes l'il titans" you ever met considering the titanic grinding job they can do. You can see them and read about them in 50-page pocket-size manual "Besly-Titan Abrasive Discs & Wheels." Speed tables, prices and illustration and description of Besly grinders are included.

58. Refractories Data

Ironton Fire Brick Co.—Help yourself to "Handy Data for Users of Refractories," an 8-page bulletin chuck full of tables on standard series brick, cupola blocks, and wedge, key, arch and circle brick used to build, repair or reline furnaces. Some engineering calculations are squeezed in too.

59. Cobalt 60 Radiography

Tracerlab Inc.—For low cost nondestructive inspection of metals and metal parts, try "Cobalt-60 Radiography Sources." 12-page booklet of the same title describes this gamma ray source, containers for it and remote magnetic handling equipment. Monitoring and personnel safety equipment is also covered.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Ideas for Foundrymen" in this issue—simply circle corresponding item numbers on one of these cards

9-52

FOUNDRY
Penton Building, Cleveland 13, Ohio

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6	21	36	51	66	81	96	111	126	141
7	22	37	52	67	82	97	112	127	142
8	23	38	53	68	83	98	113	128	143
9	24	39	54	69	84	99	114	129	144
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11	26	41	56	71	86	101	116	131	146
12	27	42	57	72	87	102	117	132	147
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Readers' Service Dept.

60. Refractory Cements

Norton Co.—What isn't in 16-page illustrated form 863-11P on refractory cements for ferrous and nonferrous metal-melting furnaces, brick laying, resistor imbedding, burner blocks and tunnels isn't worth knowing. Bulletin contains tabulated guide to cement selection, description of these refractory cements and an 8-page section on methods of preparing and installing the cements.

61. Centrifugal Blowers

Stroman Furnace & Engineering Co.—Uniform pressure over the entire range of delivery volume, from 0 to full rated capacity, is delivered by line of centrifugal blowers for melting furnaces, smelters, various oven types, etc. Units are direct motor and belt driven and are described in illustrated 4-page bulletin 300.

62. Foundry Handling Systems

C. O. Bartlett & Snow Co.—Whether it be automatic larry cars, bearings, briquette handling, rotary coolers, gears, idlers, kilns, pillow blocks, roasters, sand dryer-coolers or any of a multitude of other materials handling or processing equipment items for your foundry, you can find it in the 52-page pictorial catalog No. 104.

63. Gyrating Screens

Simplicity Engineering Co.—We could go into literary gyrations describing line of gyrating screens, but we'd rather let 12-page bulletin 52 do the job. It pictures and describes equipment used to size or wash sand, gravel, crushed stone, rock, slag, cinders, or to grade and clean every type of metallic and nonmetallic ore at high capacities.

64. Roof Ventilators

Iron Lung Ventilator Co.—Winter and summer, your workers need good ventilation—and that's not hot air. For a full description of Iron Lung roof ventilators made in from 20 to 60-in. sizes, plus ratings and dimensions, better send for illustrated folder No. 40.

65. Aluminum Cast Patterns

Accurate Match Plate Co.—To acquaint you with the variety of aluminum production pattern equipment, and to familiarize you with the type of pattern equipment necessary for this process, and finally, to help estimate castings cost through price lists and photos, we present 16-page booklet "Aluminum Pressure Cast Pattern Equipment." Match plates, cope and drag plates, core boxes and aluminum and white metal castings are covered.

66. Portable Tools

Rotor Tool Co.—"How to Choose and Use Portable Tools"—that is the question, and it's also the title of 24-page article by H. P. Bailey, company president. Author talks about calculating cost of operating portable tools on basis of replacement, cost saving factors often overlooked, selecting the right tool, standard and semistandard tools, compressed air supply and cost, air power distribution and selecting the right hose.

67. Graphite Pipe & Pumps

Union Carbide & Carbon Corp., National Carbon Div.—Resistance to corrosion and thermal shock as well as light weight, good heat transfer, machinability and availability are features of Karbate impervious graphite pipe and fittings detailed in 16-page illustrated catalog section S-7000. If you want data on pumps made of this same corrosion resistant material, section S-7200 will give them to you.

68. Foundry Sand Handling

Newaygo Engineering Co.—"Fewer Motions—More Molds—with the New Handy Sandy" is title of 6-page folder 205. What's the Handy Sandy? It's a new machine for batching and loading sand, and it's easily adapted for use with any sand conditioning equipment including squeezer and rollover machines. So, get this folder and read all about it.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

69. Hardware Making

"Hardware Castings Produced in Modern Nonferrous Foundry" is an enlightening description of the what, how and where employed at the Attwood Brass Works in Grand Rapids, Mich. Written by Ed Bremer, this 8-page FOUNDRY reprint has some worthwhile tips.

70. Whirlagig Casting

Do you want the latest dope on centrifugal casting techniques? Well then, just circle the proper number on the attached postage-free card and mail it to your favorite magazine. Poste haste, you'll receive a copy of the informative 12-page illustrated reprint from FOUNDRY entitled "Centrifugal Casting." It's written by two top experts from U. S. Pipe & Foundry Co.

71. Valve Seat Inserts

"Casting 100,000 Valve Seat Inserts Daily" is an awful lot of valve seat inserts, as well as the title of 8-page illustrated FOUNDRY reprint. How it's done and the equipment and methods used by Engineering Castings, Inc. which has been in operation just a little over five years is something you'll want to read about.

72. Oxygen in Iron Castings

Cause of excessive amounts of iron oxide in gray iron and malleable iron castings and their influences on microstructure and other properties are described by F. S. Kleeman in FOUNDRY reprint "Effect of Oxygen Content on Iron Casting Properties." Discussion also covers deoxidation methods, with particular reference to silicon carbide additions to the cupola. You'll want to get this one.

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The SCIENTIFIC CAST PRODUCTS Corp.
1390 East 40th Street
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CHICAGO 12, ILLINOIS

(Continued from page 250)

high-bay lighting, the lamps should be spaced no farther apart than the mounting height of the lighting units for even distribution. No special fixture is required except where needed for protection from spattering liquids. The new units have a high initial efficiency and a high continued output because of the protection of the reflecting surface from dust and oily deposits. Original efficiency is restored without cleaning when lamps are replaced.

For More Details Circle No. 13—Page 251

Electric Hoist: Chisholm-Moore Hoist Corp., Fremont Ave., Tonawanda, N. Y.—Push-button control electric chain hoist is available in

capacities from 250 to 2000 lb. It operates on single phase, 220 or 440 v power line. Regardless of voltage used, no more than 110 v pass through control station. It features sensitive load control for quick spotting, upper and lower safety limits, helical gears, positive chain guide, precision bearings, fully enclosed mechanism and permanent lubrication.

For More Details Circle No. 14—Page 251

Crawler Fork Lift: American Tractor Corp., Churubusco, Ind.—Crawler fork lift is designed for op-

eration indoors and outdoors on all types of terrain. It has performed successfully in mud up to 6 in. deep,

(Continued on page 256)

"BRANFORD" Vibrators

Match Plate Vibrators

Trouble-free service assured by uniformly hardened heads, tough steel body and hard chrome-plated piston. Made in three styles

and 13 sizes. Spring and angle springless types. The fast positive action of the "BRANFORD" assures a quick draw.

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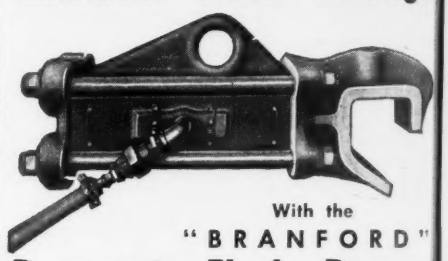
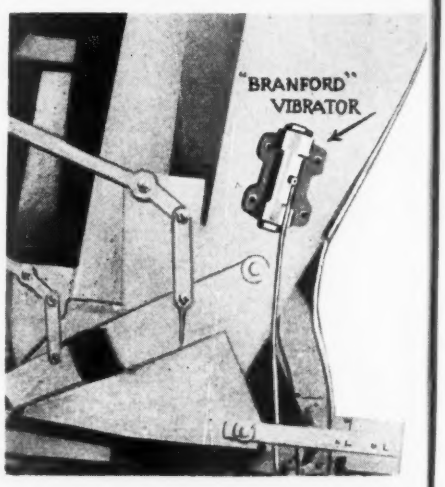


With the "BRANFORD" Pneumatic Flask Rapper

A powerful vibrating unit that will deliver unfailing service day after day under toughest conditions.
Made in seven sizes to handle flasks from 20" square up to 20' by 24' x 4' deep, green or dry sand. Jaw takes wide variation of flask flanges.
Send for questionnaire. We will quote on proper size for your work.



Instant, sure-starting "BRANFORD" vibrators on hoppers get the sand to the mold as needed. No slow downs, no sledging to damage equipment.

Write for general catalog.

NEW HAVEN Vibrator Company
1915 BRANFORD VIBRATORS U.S.A.
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Class Y Compressor

— and only a simple foundation is needed for this exceedingly compact unit.

Shipped intact as a "package" requiring only external connections, the Class Y is easy and inexpensive to install, and may readily be moved, intact, to another location if desired.

Yet it is built for continuous, heavy-duty service, with CP features that assure high efficiency and low maintenance . . . large area Simplate valves . . . multi-step capacity regulation . . . effective inter-cooling . . . precision bearings . . . force-feed lubrication.

In sizes from 75 hp. to 250 hp., 500 cfm to 1663 cfm; with direct-connected, flange-mounted synchronous or squirrel cage motor. Also available with belted and coupled motors.

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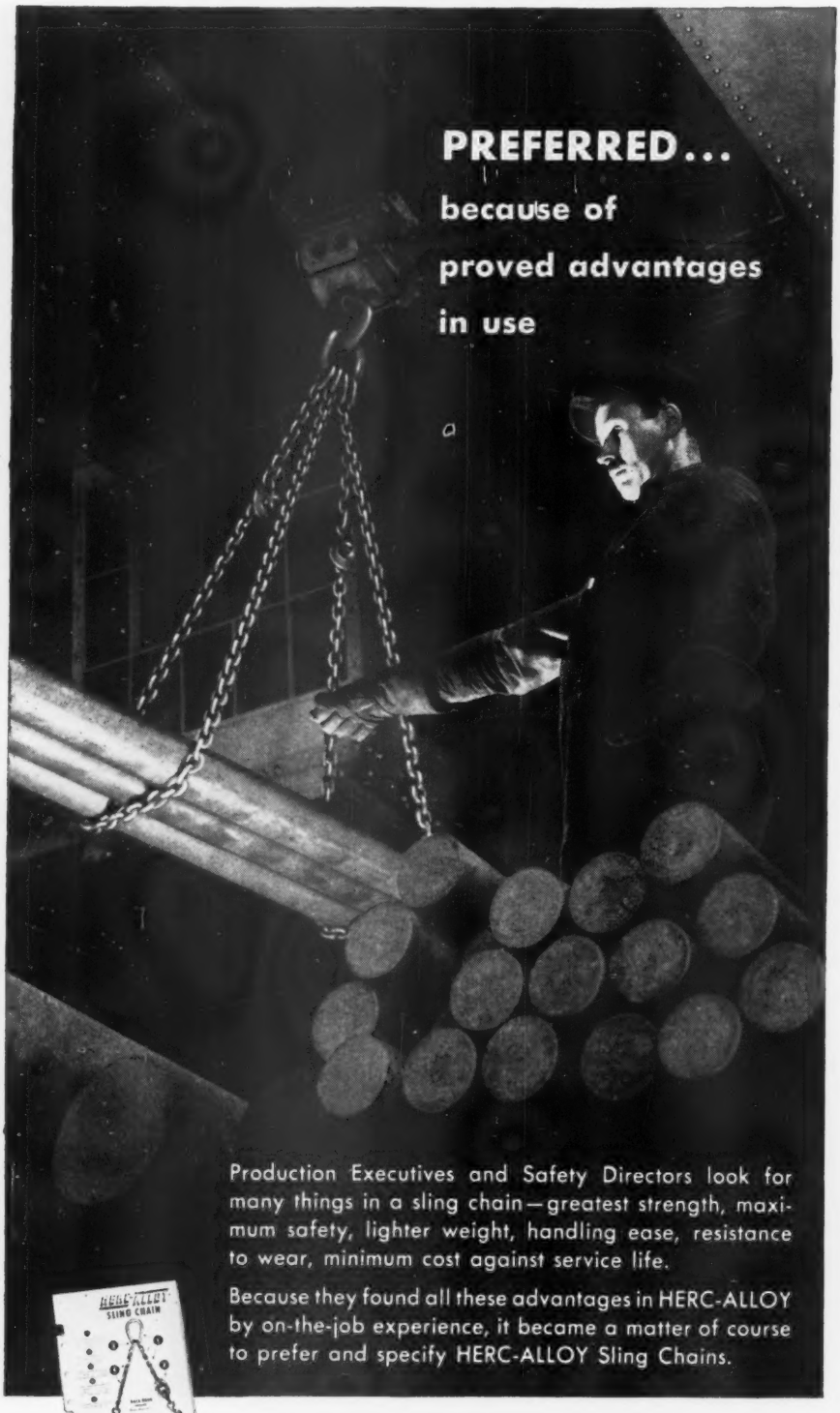
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Production Executives and Safety Directors look for many things in a sling chain—greatest strength, maximum safety, lighter weight, handling ease, resistance to wear, minimum cost against service life.
Because they found all these advantages in HERC-ALLOY by on-the-job experience, it became a matter of course to prefer and specify HERC-ALLOY Sling Chains.

Write for illustrated Data Book No. 3 which contains helpful information on sling chain selection and use.

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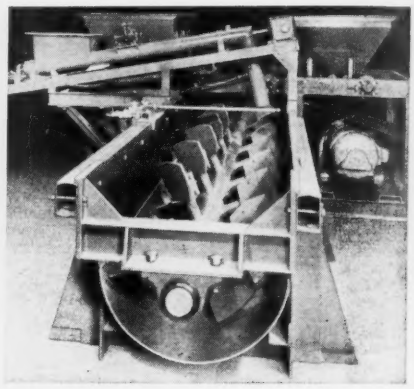
(Affiliated with Chisholm-Moore Hoist Corp.)
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
***District Offices*: New York • Chicago • Cleveland**
Other Factories at Angola, N. Y., Dixon, Ill., St. Catharines, Ont., Can., and Johannesburg, South Africa.

(Continued from page 254)

and, when equipped with rubber track shoes, it can work inside warehouses and factories. In addition to its uses as a fork lift, the unit can be converted, with attachments, for use as a bulldozer, angle dozer, loader, snow plow, and for various other applications. It is available in 2000, 4000 and 6000 lb capacities, with lifts of 6 ft, 8 ft 7 in. and 12 ft.

For More Details Circle No. 15—Page 251

Mixer: Kent Machine Co., Cuyahoga Falls, O.—Continuous mixer receives, proportions, mixes and delivers material automatically. Two or



more ingredients can be mixed. The slicing, turning, shoveling action is variable and adaptable to a wide range of requirements. Three sizes are available. In operation, the machine is set and started. Thereafter it operates automatically, leaving the operator free to do other work.

For More Details Circle No. 16—Page 251

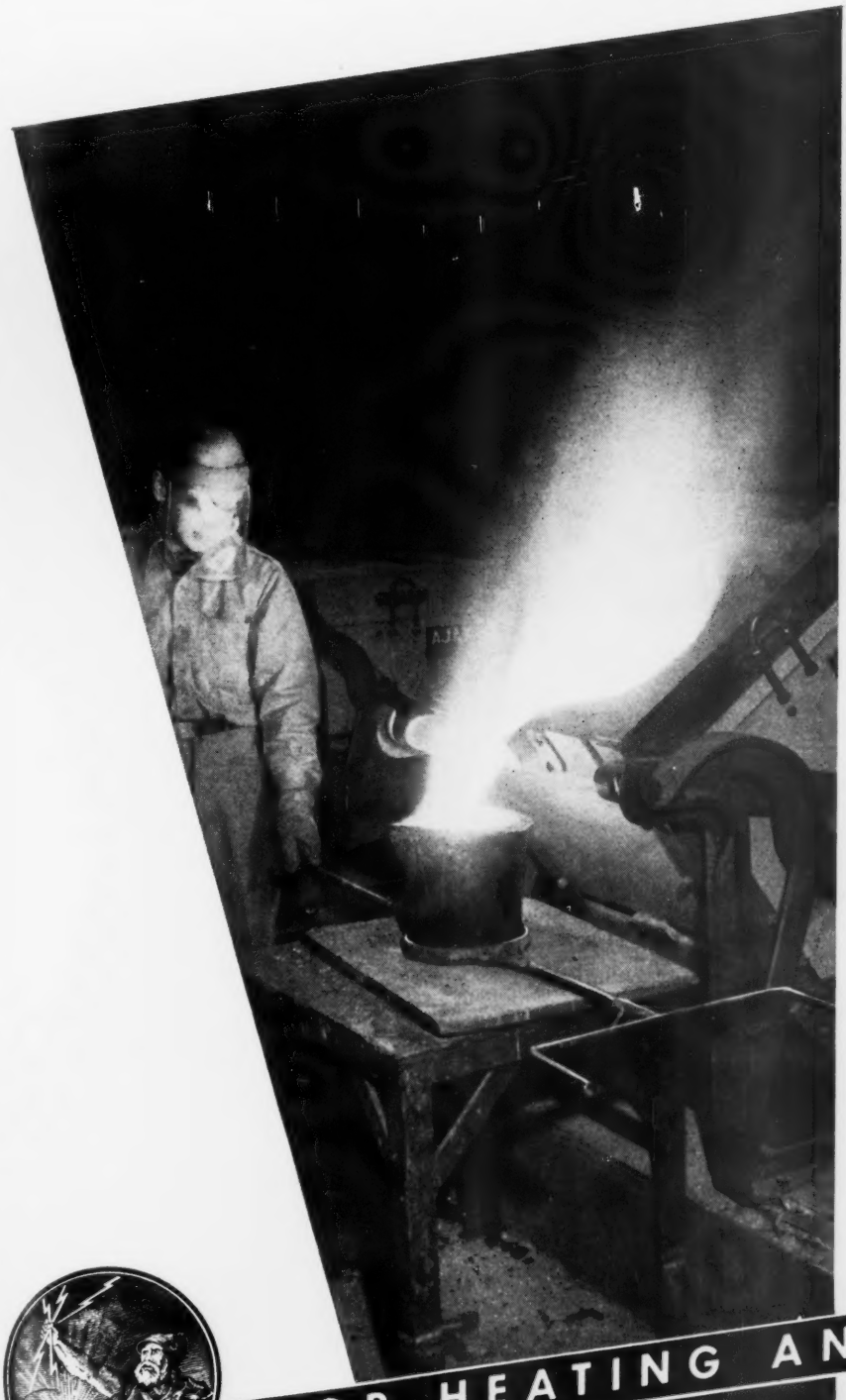
Respirator: Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8—New dust respirator weighs 2¾-oz and features

minimum breathing resistance. Small overall width of the filter holder reduces blind spot area in the downward vision. Construction of the assembly permits quick changing of

(Continued on page 258)

Save critical alloys

WITH AJAX-NORTHRUP INDUCTION MELTING



High speed melting enables Ajax-Northrup high-frequency furnaces to recover *all* of the nickel in the charge, 99% of the chromium, 95% of the molybdenum . . . consistently high percentages of every alloying element.

The difference between these figures and the performance of ordinary furnaces represents *savings* . . . both of money, and of critically hard-to-get alloys.

For instance, a 2% chromium saving in one Ajax-Northrup equipped foundry saves ten tons of ferrochrome a month, or $60,000 a year. (Melting capacity 1,000,000 lbs. a month—63% ferrochrome @ 25¢/lb.)

$60,000 a year pays for the furnaces in short order—and the chromium saved is enough for an extra 70,000 pounds of 18 and 8 stainless steel a month.

The figures are slightly different for other critical alloying elements. But the arithmetic's the same—the total savings frequently just as impressive.

Besides saving metals, Ajax-Northrup furnaces melt at extremely high speed, with composition controlled within 0.25%, pouring temperatures within 20°F.

There's an Ajax-Northrup furnace to fit every melting job, including yours. Write us today for details.

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FOR HEATING AND MELTING

139

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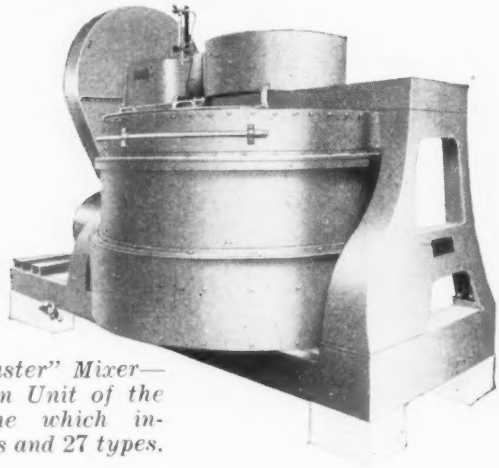

EBG 4½ "Lancaster" Mixer—Heavy Production Unit of the "Lancaster" Line which includes 7 unit sizes and 27 types.

FOR
- **CORE SANDS**
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By bringing modern machine tool precision to the mixing process, "Lancaster" Mixers have helped foundrymen eliminate waste in the mixing of core sands . . . facing sands . . . and general purpose sands.

In core sand mixing, "Lancaster" Mixers effect substantial savings in oil and binders with no sacrifice of controlled core strength or other desired characteristics.

For mixing facing and general purpose sands, "Lancaster's" rapid counter-current mixing-mulling action permits reclamation of a higher volume of used sand . . . avoids lumps and nodules and the need for aeration after mixing.

With "Lancaster" Mixing, grain sizes are dependably distributed and preserved throughout the mixing process. Binders of any kind are mixed with maximum efficiency.

Power requirements? "Lancasters" are misers, operating at maximum capacity on minimum power.

Write today for free bulletin devoted especially to "Lancaster" Mixers in the foundry industry. No obligation.

POSEY IRON WORKS, Inc.
Brick Machinery Division
LANCASTER, PENNSYLVANIA

(*Continued from page* 256)

filters and easy replacement of parts. The formable aluminum facepiece readily is molded to all normal face contours, and the replaceable face cushion conforms to all facial lines to assure a perfect seal without uncomfortable pressure. Throw-away filter is made of charged resin-treated felt which creates a static electrical field and supplements the mechanical filtering action by trapping dust particles. Air intake is located at the lowest point of the respirator so that counter gravity flow reduces entry of heavier dust particles, thus extending filter life.

For More Details Circle No. 17—Page 251

Air Blaster: Chelsea Fan & Blower Co., Inc., 639 South Ave., Plainfield, N. J.—Heavy-duty, high-velocity, portable air blaster for in-

dustrial applications can be used as either exhauster or blower. The direct-drive, ball-bearing motor is totally enclosed, and the cast aluminum, nonoverloading airfoil propeller is protected by heavy mesh wire guards at both ends. The machine will operate with flexible canvas tubing and where static pressure is encountered. Sizes from 18-in. to 42-in. move air at from 6600 to 34,000 cfm. The blaster is also available in floor mounting without stand.

For More Details Circle No. 18—Page 251

Metal Loader: C. M. Kemp Mfg. Co., Baltimore 2, Md.—Automatic loader for charging metal into melting pots consists of a detachable cart and a hoisting mechanism for raising the loaded cart, dumping load into furnace and returning cart to the floor. Cart is equipped with wheels and bail type handle for floor transportation in gathering the metal

(*Continued on page* 260)

TO ALL outward appearances any two grades of shot or grit may appear to be as much alike as peas in a pod—but there the similarity ends. Rarely do they perform alike.

In using HI-GRADE Shot and Grit you'll find there IS a difference . . . a recognizable value far beyond purchase price that shows up in extra performance on the job.

Though you may be satisfied with the material you are now using, it is just good business not to deny the promise of uniform, lower cost, more efficient blast-cleaning which HI-GRADE Shot and Grit can fulfill for you.

You can't be blamed for wanting longer use-life in the abrasives you use—more efficient cleaning and peening—a better finish in less time. Get these advantages with HI-GRADE Shot and Grit. Requisition a trial quantity today. You'll never regret it.

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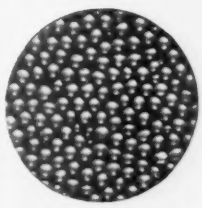

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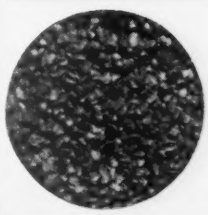
Withstands repeated strain, stress and wear. Exclusive alloying and tempering process helps prevent rust; minimizes impact fractures.



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SHARP, TOUGH AND DURABLE
Made of same material and processed by same methods as Hi-Grade Shot. Cleans with maximum efficiency. Reduces equipment wear and maintenance costs.

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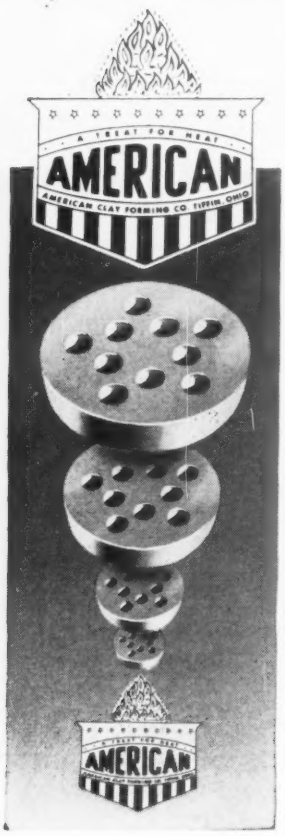
CERAMIC Strainer Cores!



★ Cut down on rejects . . . make every casting a good one— by using American Ceramic Strainer Cores. American Cores remain round and uniform during the pouring operation . . . slag remains on TOP of the core. The result? An evenly poured, slag-free casting EVERY time.

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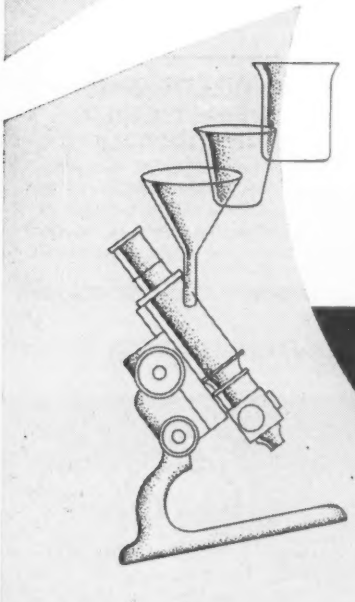


Charles C. Kawin COMPANY
431 So. Dearborn Street, Chicago 5, Illinois
P.O. Box 2035, Buffalo 5, N. Y.

(*Continued from page 258*)

charge. The handle is engaged by hoist hooks for raising. Guide rollers on the cart ride in grooves on the hoist frame. These grooves guide the cart over the furnace and tilt the cart for emptying.

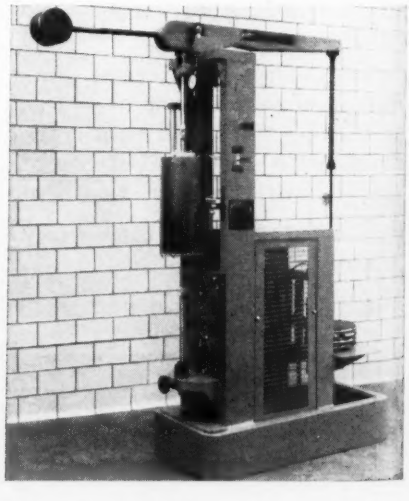
For More details Circle No. 19—Page 251

Goggles: Fendall Co., 4631 North Western Ave., Chicago 25—New line of cup-type goggles includes chippers,

welders, and dust and splash goggles. Each cup is molded individually to conform to both right and left eye areas of the face, with smooth, wide-bearing facial contact surfaces that distribute the weight evenly for added comfort. More than 300 perforations in side shield are said to allow ample air circulation, and added ventilation through slots in lens ring provides circulation across inner lens surface to reduce fogging. Cups are said to be unaffected by moisture or perspiration.

For More Details Circle No. 20—Page 251

Creep Tester: Arcweld Mfg. Co., 140 46th St., Pittsburgh 1—Lever arm creep testing machine of 12,000 lb capacity has been designed for convenience and reliability in creep rupture tests and regular creep testing. Developed by the research laboratory of Heppenstall Co., Pittsburgh, it is manufactured and sold by Arcweld Mfg. Co. Features include a power-operated lifting mech-

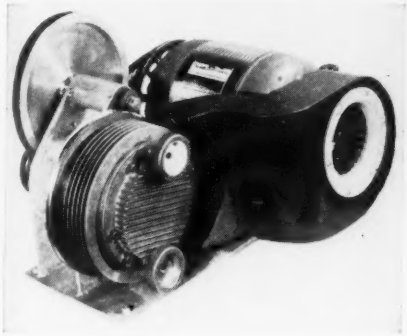


anism for weights used for loading specimens and a base with leveling screws and a new type of shock absorber and vibration isolator. Tests

may be made in three heating zones to a maximum of 1800° F. Temperatures in the three zones can be regulated from the control panel. Specimen grips are of special heat-resistant alloy steel and extension grips are of heat-treated and chrome-plated steel.

For More Details Circle No. 21—Page 251

Shot Tester: Precision Shot Co., 159 Pierce St., Birmingham, Mich.—Portable, bench-type machine for abrasive shot and grit testing is used to subject samples to repeated impact in a manner similar to that in production shot blasting machines. Useful life of the different shot samples is indicated by screening the samples through standard sieves after a standard length of time in the machine. Unit is powered by a ¾-hp, 110-v motor and uses a 50-gram shot or grit sample. It is recommended for acceptance testing of shot shipments as well as for laboratory testing. Machine tests a sample in less than a minute. Total time to obtain test results is approximately 5 minutes.



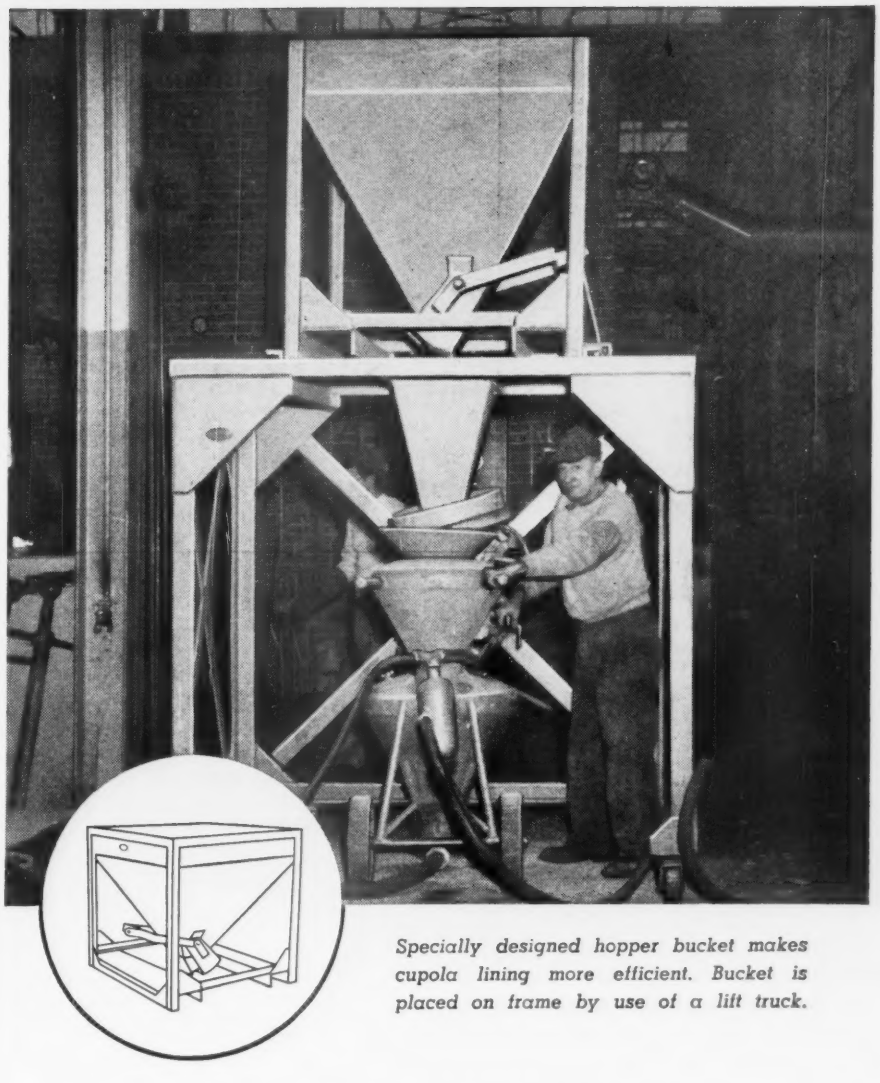
For More Details Circle No. 22—Page 251

Cab Windows: Cast Optics Corp., Riverside, Conn.—Cast plastic sheets, said to be as clear as plate glass, their light transmission factor being 92 per cent, are being used to glaze cabs of Harnischfeger Corp. cranes and excavators. The plastic is resistant to mechanical and chemical crazing and has high abrasion resistance, it is claimed. Other features claimed are resistance to impact, chemical action, and spatter of molten metals. Sheets are available in standard sizes from 36 x 48 in. to 46 x 96 in. and in thicknesses from 0.02 to 0.5 in.

For More Details Circle No. 23—Page 251

Inspection Cabinet: Bar-Ray Products Inc., 209 25th St., Brooklyn, N. Y.—Cabinet is fabricated for radiographic or fluoroscopic inspection of parts. It is designed for straight line or rotary operation. Trays for

(*Continued on page* 264)



Specially designed hopper bucket makes cupola lining more efficient. Bucket is placed on frame by use of a lift truck.

Solve Your Material Handling Problems With **PENN IRON SPECIAL EQUIPMENT**

In lining cupolas, Textile Machine Works foundry in Reading, Pennsylvania, had difficulty handling the clay mix used with their Bondactor equipment. After a study of the problem, Penn Iron Works, Inc., designed, engineered and manufactured this special hopper bucket for maximum handling efficiency.

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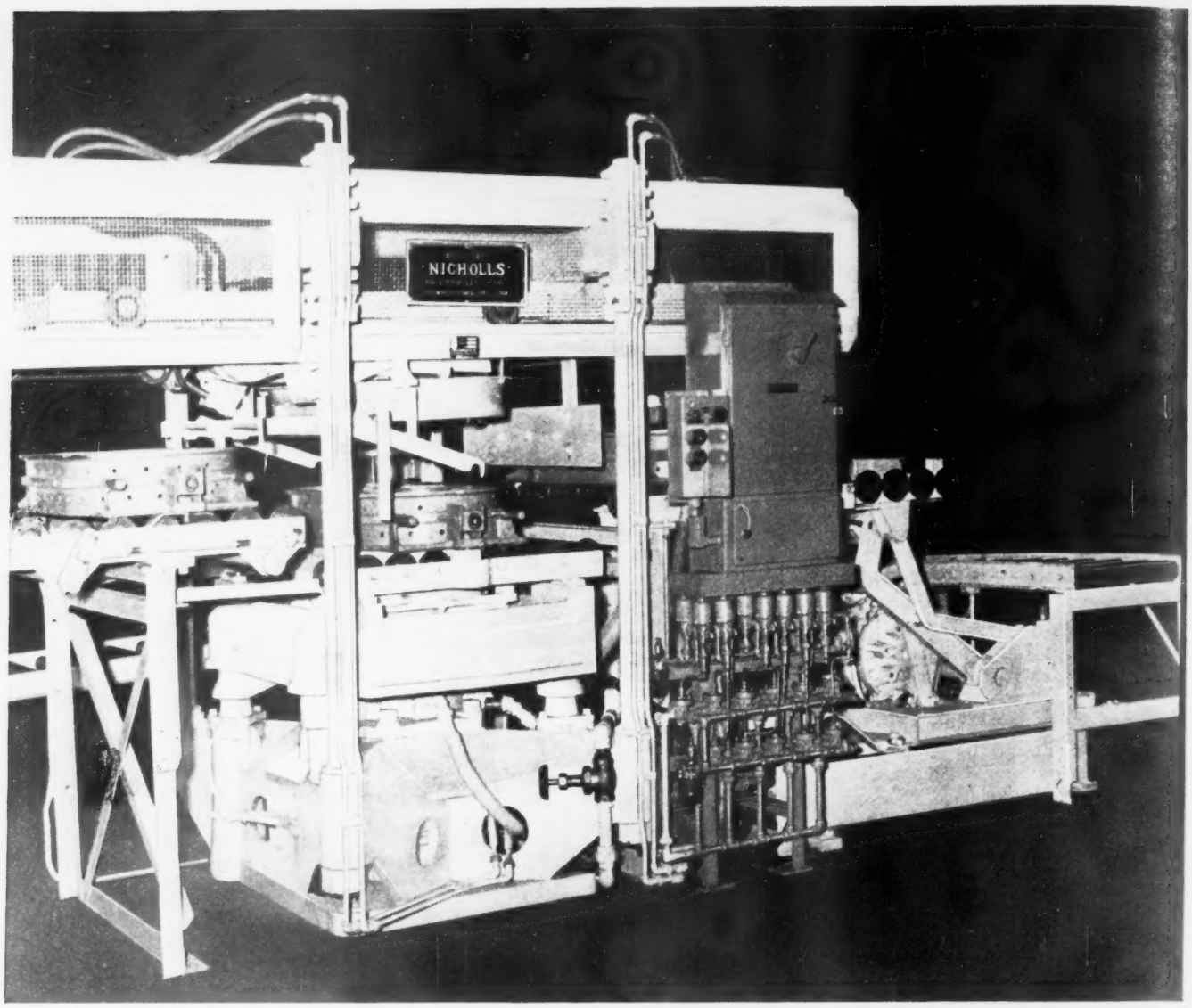

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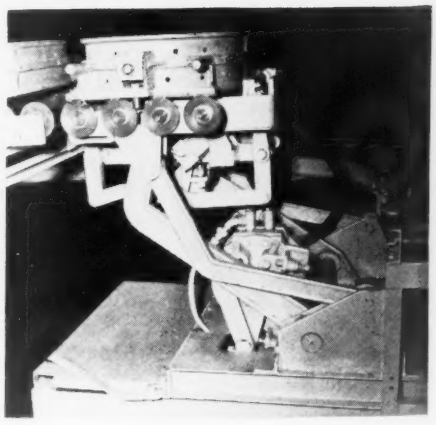
three new steps in the operating cycle for greater molding ease



When automatic jolting and squeezing have been completed, the pattern is drawn from the mold on rollers (Picture No. 1) and automatically pulled to the roll-out extension. It is moved to the turn-over rollers (Picture No. 2), and turned above the moving conveyors. The mold is lowered (Picture No. 3) on to a moving conveyor, and the clamps automatically released.

fully automatic operation makes better molds faster with this remarkable new "push button" molding machine

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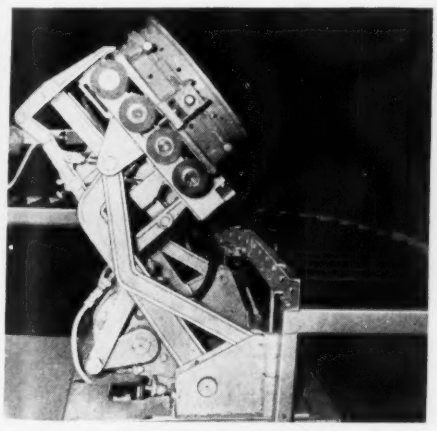

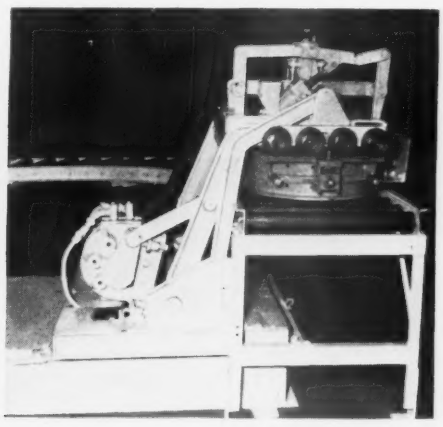

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(*Continued from page* 261)

holding film and parts are moved into cabinet from either end, facilitating x-ray exposure. After each exposure, doors are raised and parts trays are moved into position for next exposure. Cabinet is of all lead-lined metal construction. It has pneumatically operated lead-lined sliding doors, which afford the operator protection from all radiation.

For More Details Circle No. 24—Page 251

Surface Grinder: PDQ Grinder Co., Six Manhasset Ave., Port Washington, N. Y.—Surface grinding machine is designed for fast and accu-

rate generation of flat surfaces on various kinds of metal parts including gray iron, steel, tool and stainless steels, die castings of aluminum or zinc, bronze and numerous alloys. Grinder employs a 12-in.-diam cylinder type grinding wheel mounted in a vertical plane and recessed within the work surface of the grinding table. Surfaces as wide as 9½-in. can be finished, and the amount of stock removal is regulated by a positive feed control governing the depth of cut for various classes of work. Front section of the work table may be removed, permitting grinding of parts having side obstructions or angular surfaces. The main drive is from a 2-hp vertical mounted motor through multiple V-belts to a floating spindle pulley carrier. Accessory and other equipment includes a motor-driven dust removal system for dry grinding and a complete coolant system having a built-in motor-driven pump and separate tank for wet grinding.

For More Details Circle No. 25—Page 251

Handler: Tracerlab Inc., 130 High St., Boston 10—Magnetic remote handler has been developed for positioning and manipulating radioactive sources encased in ferromagnetic materials, with increased safety for radiographers. Weighing 2 lb, 15 oz, the handler is constructed of aluminum tubing and has a 12-in. chrome-plated, flexible gooseneck leading to

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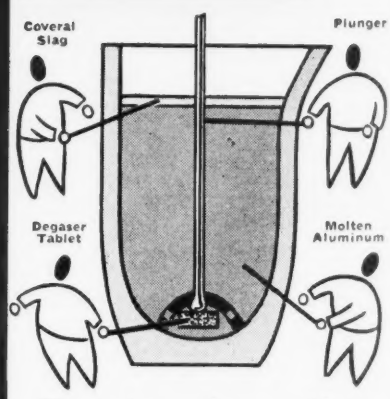

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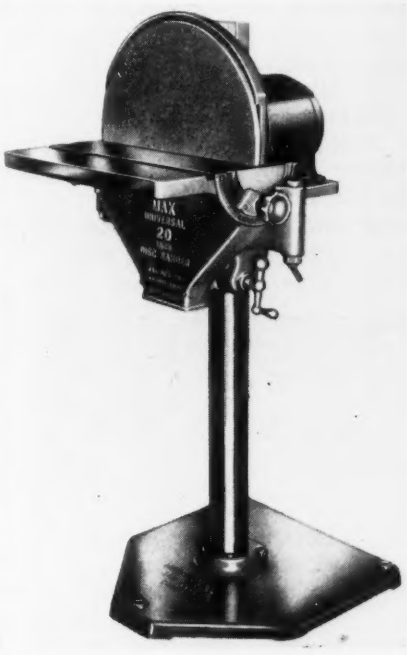
a short, stainless steel tip. A permanent magnet is encased in the tip and a cast aluminum grip, curved to fit the hand, is depressed to withdraw the magnet from the inner surface of the tip and thus release the source. Unit is 6 ft long.

For More Details Circle No. 26—Page 251

Primer Sealer: Maintenance Material Co., 2200 North Third St., Milwaukee 12—Nontoxic lacquer type primer sealers have been formulated to give a hard, nontacky protective film to castings and parts while in process, transit, or storage. They may be applied by dip, spray or brush to any clean, dry, oil-free surfaces. Part is ready for transit, storage or machining in 10-15 minutes. After machining, casting should be washed clean of chips, oils, greases, and dirt before applying finish paint coat. Sealers are said to resist oil, alkali, water, scuffing, flaking, chipping, and temperatures to 270° F.

For More Details Circle No. 27—Page 251

Sander and Grinder: Max Mfg. Co., 138 Stockton Ave., San Jose 26, Calif.—The company has introduced a 20-in. disk sander and grinder which reproduces the features of its 16-in. model. Like its companion model, the new one can be used either as a sander for woodworking or a grinder for metalworking. Used as a disk grinder on metal, it eliminates many costly machining operations. The table tilts quickly and



easily to any angle from 45 degrees up to 45 degrees down, even when grinding large surfaces. The cast aluminum disk can be easily and quickly removed. The machine does not require bolting down.

For More Details Circle No. 28—Page 251

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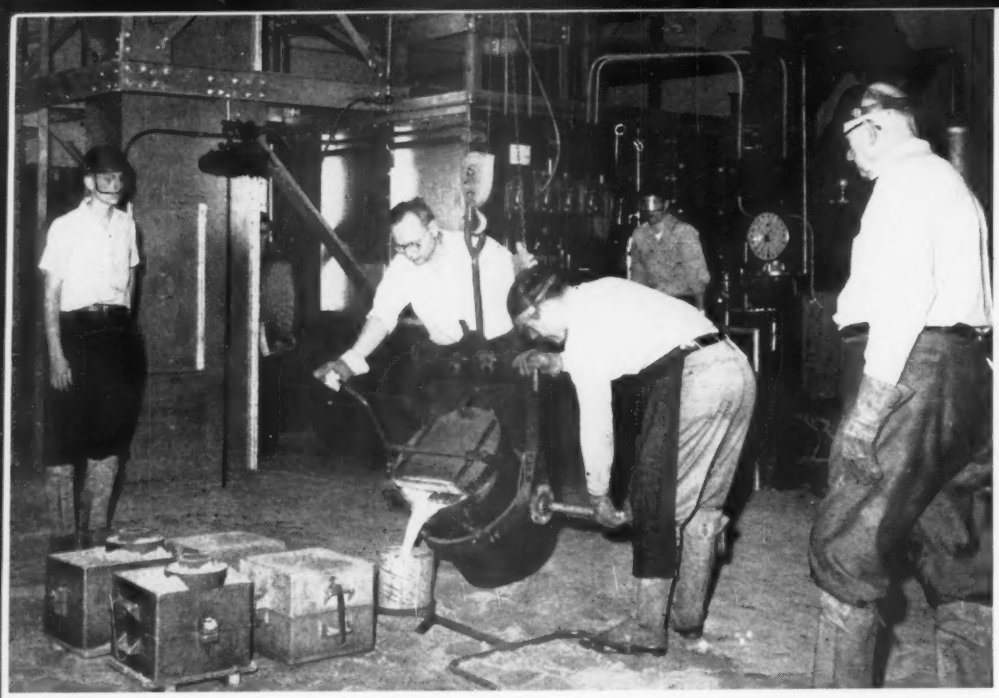


Profs. C. T. Marek, H. A. Montgomery, and L. D. Weast, second, third, and fourth from left, fill a double shank ladle which will be poured by students

Purdue University Converts to *Modernized Foundry*

By JAMES W. MAYER
Purdue University
West Lafayette, Ind.

CONSCIOUS of the foundry industry's demands for engineers with a practical concept of foundry production methods, Purdue University has completely redesigned its foundry. In the $120,000 conversion, the foundry was changed from a dirt-floored, poorly ventilated job shop foundry, to a flexible production layout.

It is a foundry designed primarily for engineers. Set up on the basis of a three-phase program, its first purpose is to acquaint the undergraduate engineers with the foundry industry so that the knowledge of the advantages and methods of casting processes can be applied to the relationship of design to economical production. Along with student instruction, the other phases cover the actual production of castings for the machine shops and welding courses as well as handling the extensive research and development programs of the laboratory.

In the redesign of the foundry it was necessary to have enough of the elements of a modernized foundry to illustrate the importance of mechanization and yet include enough basic principles to highlight the fundamentals behind foundry operations. It was felt that any system installed would have to be flexible enough to permit every student to operate each type of equipment without, however, decreasing production efficiency of the unit.

Prof. C. T. Marek of the General Engineering staff at Purdue started the planning of the new foundry laboratory in 1950. He worked with the Industrial Advisory Committee of the Foundry Education Foundation, an advisory group which was headed at that time by Paul Harlan, vice president of the Electric Steel Casting Co. The present chairman is Fred Carl, resident manager, Fabricast Division of General Motors Corp.

A major task in the conversion to a semimechanized foundry was ripping out the old equipment—the cupola built in 1898 was the first of the antiques to go. Fortunately, some of the basic equipment such as the jolt squeezers, production molding machines and cleaning equipment could be used in the new setup. The floor plans were drawn up so that the 65 x 105-ft floor space would be large enough to handle the change without a major modification of the building. An addition 15 ft wide was erected along the length of the foundry to provide for additional laboratory and storage space.

Working with the shell of the old layout, the first job in the mechanization was the excavation for the sand-handling system. This two-level system carries sand as it drops through the four shakeout grates to the belt conveyor that operates under the cement floor. The sand travels over a magnetic pulley into a bucket elevator that discharges the sand through a vibrating deck screen into either the ferrous or nonferrous sand storage bins.

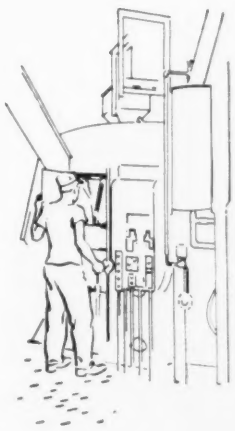
A skip hoist carries the sand from the bin discharge gates, when needed, up into the muller that is set at the floor level. The sand is carried from

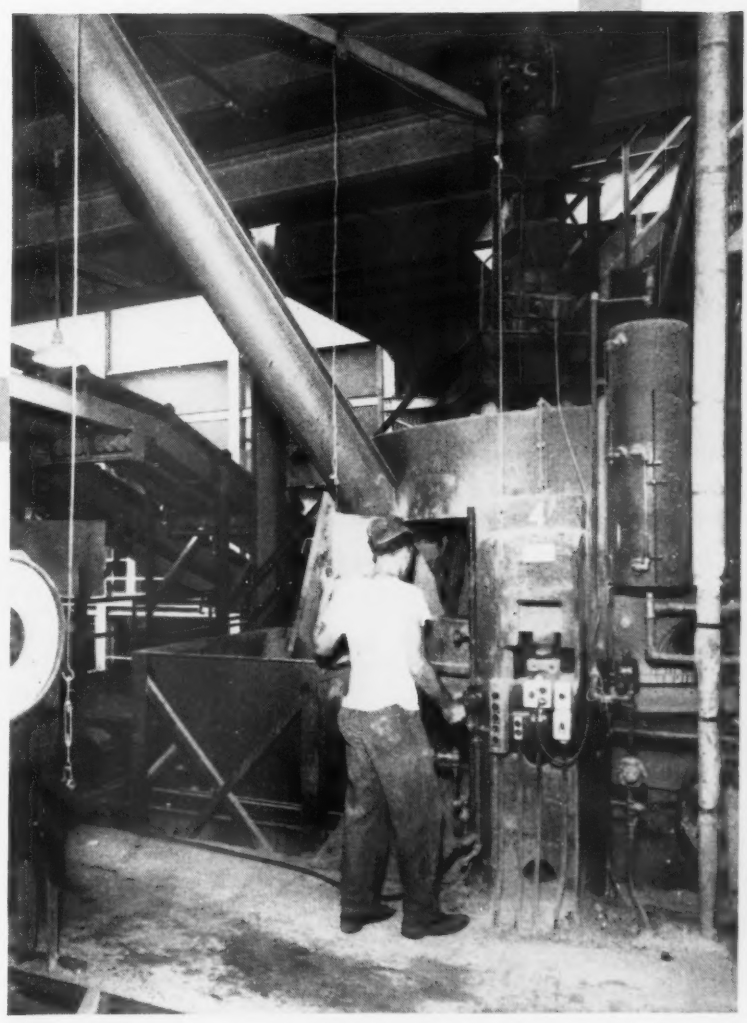
(*Continued on page* 268)

Student at a jolt-squeeze molding machine is closing a mold

PERFECT SAND PREPARATION CAN BE AUTOMATIC

with a *Clearfield Mixer*





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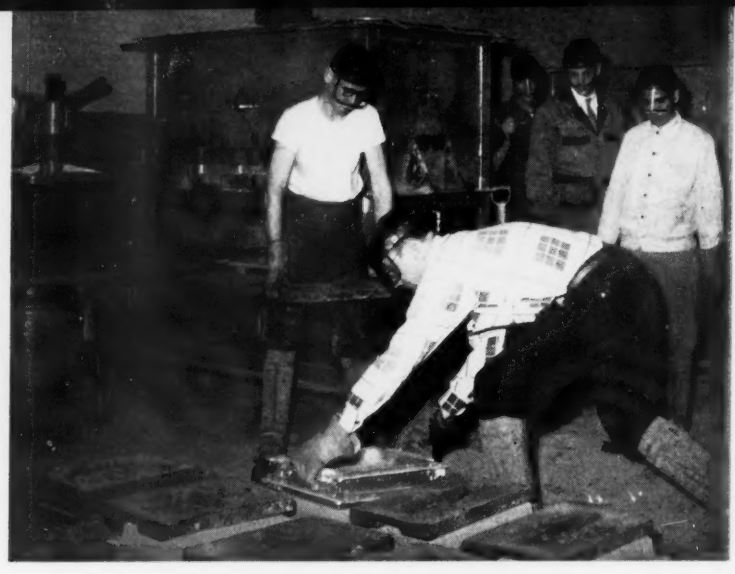

Students shift weights and pouring jackets while student holding ladle skimmer watches

Molds are dumped over a floor grating through which sand falls to a 40-ft belt conveyor

One of the women students helps load castings into an airless blast cleaning machine

(*Continued from page* 266)

the muller to the group-bin molding stations by a 4-cu-ft capacity bottom dump bucket that travels along the overhead crane system. Each of the four group bins holds about 16 cu ft of sand which is used by the molding machines as well as the four molding benches built into each group bin.

The nucleus of the fundamental machine instruction will be the four portable jolt-squeezers, with the six other types of molding machines in the foundry used for production requirements. For example, in the production of drill press bases for the Purdue machine shop, the drag will be made on a jolt-squeeze rollover pattern draw; the cope will be turned out on a jolt-squeeze pin stripper. The cope and drag for the drill press table will be made simultaneously on a jolt rockover footdraw.

As in molding operations, the coremaking varies from hand operations to the high production core blowers. Jolt-squeeze hand rollovers, along with an oven and portable muller, comprise some of the other coremaking equipment. For the most efficient handling of sand additives, such as cereal and seacoal, the foundry engineering staff improvised its own storage bins.

In the study of cast iron, steel, brass and aluminum for class operations, the melting system depends primarily on a 2½-ton capacity cupola, direct and indirect arc furnaces, two induction furnaces, and a gas-fired furnace. Two 500-pound bull ladles are used to receive cupola metal and transfer it to hand ladles poured by students at their mold bays. Like the bottom-drop buckets, the bull ladles are suspended from two overhead crane systems. The systems serve a dual purpose in carrying metal from the cupola and other melting furnaces to the pouring floor and sand from the muller to the molding floor.

The cleaning room is functional in nature with the conventional sand blasts, airless abrasive machines, tumbling mills, band saw and grinders. The utility room, located between the cupola and the cleaning room, contains maintenance equipment, some of the research projects, and the hydraulic hoist that carries cupola charges from the delivery

(*Concluded on page* 270)

material handling expense ?

Material handling is non-productive labor that speeds up productive labor if you do it right.

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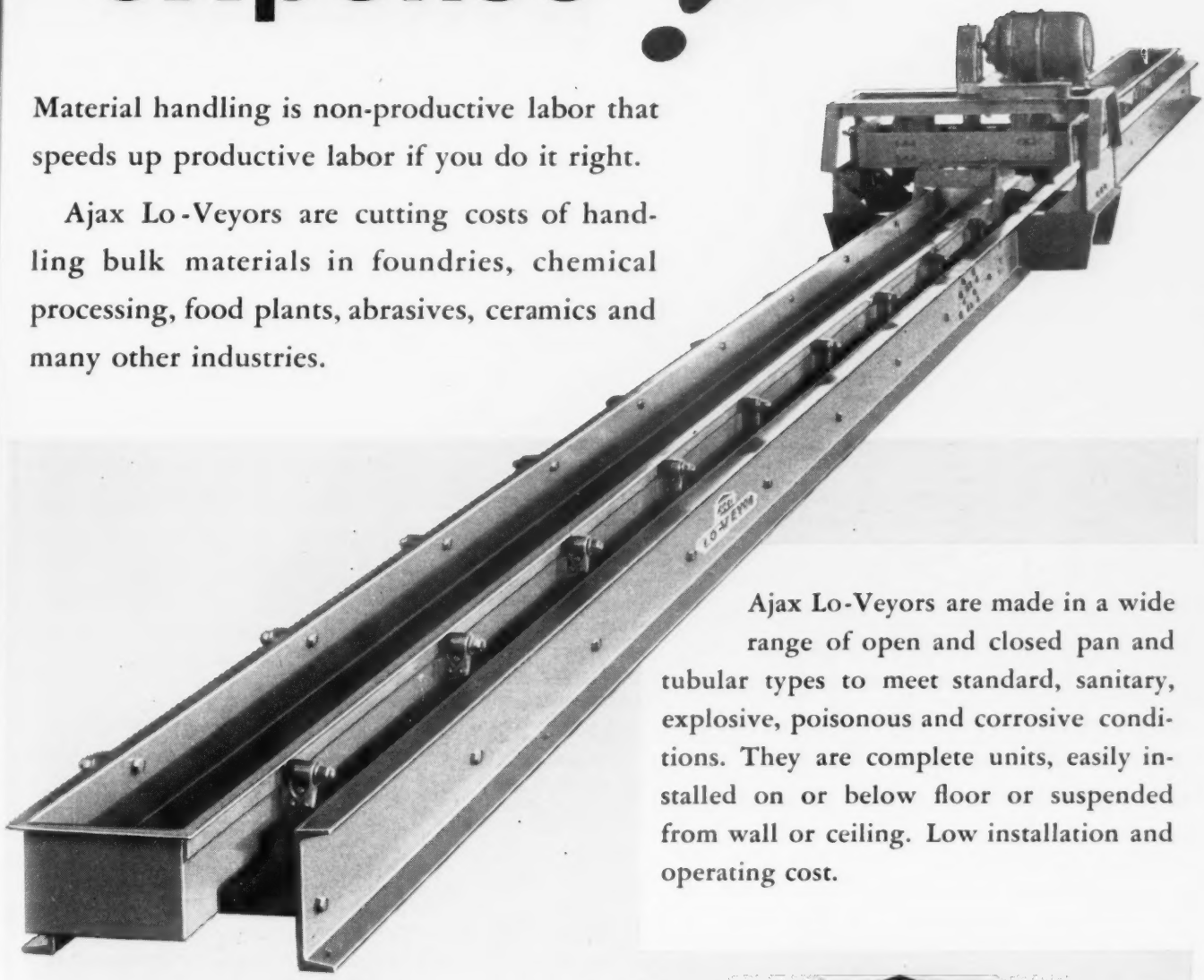

Ajax Lo-Veyors are made in a wide range of open and closed pan and tubular types to meet standard, sanitary, explosive, poisonous and corrosive conditions. They are complete units, easily installed on or below floor or suspended from wall or ceiling. Low installation and operating cost.

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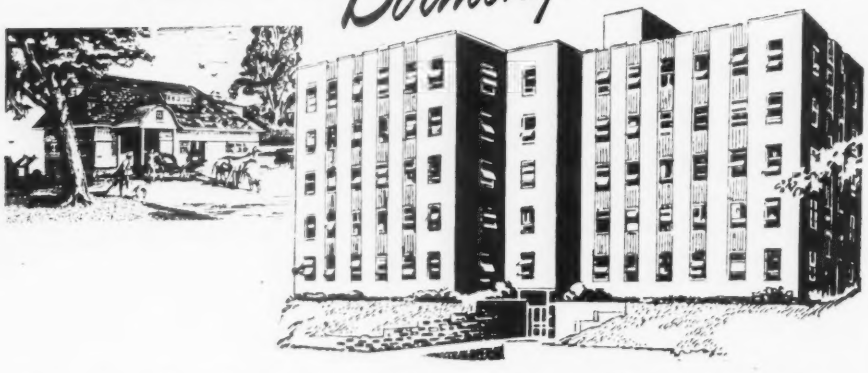

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(*Concluded from page* 268)

door to the charging deck. In the storage rooms, the major problem was the utilization of all available space, with flasks and patterns stored to the ceiling. In the daily operation of the foundry, one of the routine principles emphasized is that "a place must be found for everything and everything must be in its proper place."

As far as the student is concerned, the most welcome change was the modernization of the lecture and demonstration room adjoining the foundry. Previously a cramped, poorly lighted and ventilated cranny, the room now has modern arm desks, fluorescent lights and good ventilation.

The new foundry setup is often referred to as a laboratory because of the expanded facilities for research and control. The metal control laboratory, one of the new sections, uses carbon and sulphur analysis plus the various strength tests to study methods of mixing charges to obtain certain chemical and physical properties. Core and molding sand is analyzed in the sand laboratory, which contains a comprehensive layout of sand testing equipment. This includes a dilatometer; moisture, permeability and strength testers, and a test core baking oven.

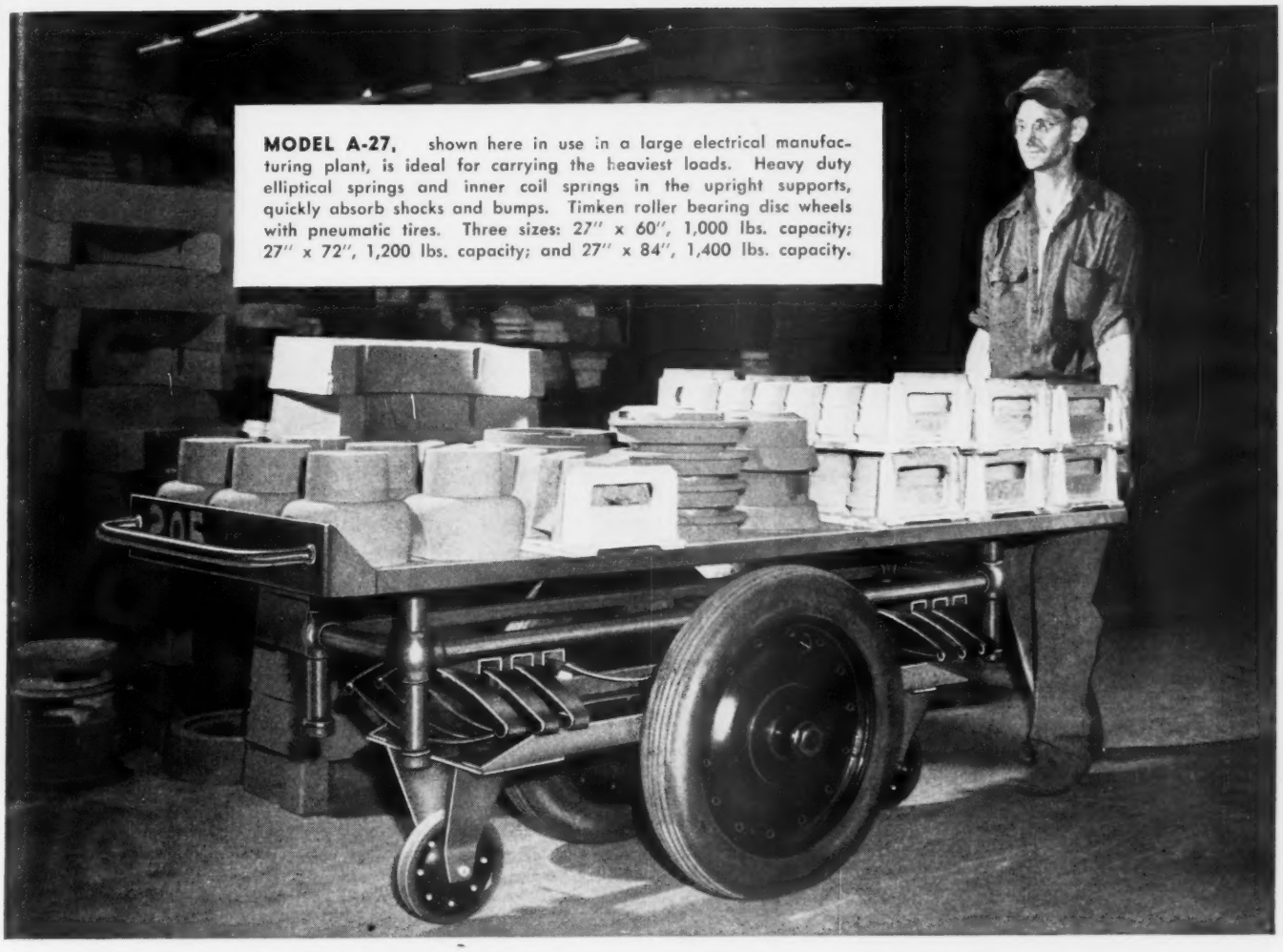
The modernization of the foundry reflects a determination on the part of Purdue and other universities to expand and modernize their facilities to meet the ever increasing demands of our mechanized economy.

Book Review

Statistical Quality Control, by Eugene L. Grant, cloth, 557 pages, 6 x 9 in., published by McGraw-Hill Book Co. Inc., New York. Price $6.50.

First published in 1946, this work is now available in a new edition incorporating a number of changes designed to improve interest and value. The last seven chapters have been rewritten so that new material might be incorporated, particularly on acceptance sampling. The number of problems has been more than doubled, with 30 per cent of the answers given. New material has been included in the appendix.

Designed to be both a textbook and a practical working manual, the book concerns statistical methods which in recent years have been used successfully in nearly all types of manufacturing to improve product quality and to reduce the cost of spoilage, rework and inspection. The author is professor of economics of engineering at Stanford University.



MODEL A-27, shown here in use in a large electrical manufacturing plant, is ideal for carrying the heaviest loads. Heavy duty elliptical springs and inner coil springs in the upright supports, quickly absorb shocks and bumps. Timken roller bearing disc wheels with pneumatic tires. Three sizes: 27" x 60", 1,000 lbs. capacity; 27" x 72", 1,200 lbs. capacity; and 27" x 84", 1,400 lbs. capacity.

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Sand Reclamation

(*Continued from page 95*)

volves at 12 rpm. Fine spray nozzles are installed at the inlet end of the barrel and are thermostatically controlled in steps by the temperature of the sand at the discharge end of the barrel. A series of horizontal lifting shelves inwardly projecting pick up sand and discharge it on rotation into the center of the barrel, thereby thoroughly mixing sand and water. Calculations indicated that approximately 2 gpm of water are required to reduce the temperature of the sand from 900 to 250°F at the rated capacity of 8000 lb of sand per hour. Housing around the discharge end of the barrel is provided with a stack through the building roof to discharge steam generated in the barrel. In operation, sand from the cooler can be maintained at 180°F without encountering too much recondensation in the stack.

The cooler discharges into an elevator which conveys sand to an American Air Filter fines cascade for separating the reclaimed product into the two basic sands of the screen classification originally purchased. These are shown in Fig. 6 as described previously.

It has been found in operation that the actions of the cooler and fines cascade remove a large percentage of ash which is left in the grains as a result of the burning operation in the Nichols furnace.

The measuring devices shown between the air classifier and belts, conveying the sands back to the storage bins, consist of a box of known capacity having a hinged and counterweighted bottom which opens when full to discharge the load. A Veeder counter records the number of times the box is filled. From this information the tonnage of sand reclaimed can be calculated. It has been found that this type of measuring device is accurate enough for most purposes.

The loss through the reclamation plant can be calculated, roughly, from the size of the opening in the storage bin and the speed of the pan feeder as compared with the reading obtained from the measuring devices after the air classifier. It indicates approximately a 20 per cent loss which consists of the clay, silica flour, binders, carbonaceous matter, fines and water removed from the refuse sand in the reclamation process.

Operating Results—Table II shows the tons of sand reclaimed during 1949 and 1950 and to August 1, 1951, a total of 31 months. This shows that the total output of the plant was 76,489 tons during this period. This is an average of approximately 2500 tons per month or 82½ per cent of its rated capacity of 3000 tons.

Table III shows direct and indirect costs per ton for this period. The direct operating labor consists of one man per shift and for continuous operation requires a crew of four men. At present, the average hourly rate for this labor is $1.65. Service labor for oiling, burner cleaning and operational adjustments is charged directly to the operation as is the necessary repair labor and material. The overtime premium of time-and-one-half for Saturday and double time for Sunday operation, as well as the night work bonus, are included in the cost. The plant carries its share of the plant general cost and includes such items as power, water, supervision, etc. Water used is raw Delaware river water, and the plant requires approximately 125 gallons per minute. Cost of this water is relatively cheap since the principal expense is the power for pumping.

Depreciation and property taxes are based on the installation's actual cost, $130,675.20.

Total connected motor load of the plant is 105 hp. The power is not metered separately. It is estimated that the power consumption is approximately 30,000 kwhr per month including lighting or 10 kwhr per ton of product.

The largest item of cost in the operation of the plant is the cost of the Bunker "C" fuel oil used in the Nichols furnace. Table IV shows the operating data in this respect.

Table IV shows that the increased fuel cost in 1951 is due to the rising price of Bunker "C" oil in this district since the fuel consumption per ton of sand reclaimed has remained

(*Continued on page 274*)

TABLE II—Tons of Sand Reclaimed

	1949 12 Mos.	1950 12 Mos.	1951 7 Mos.	Total 31 Mos.
Dorchester sand	18,789	15,113	10,179	.....
Grade "C" sand	12,414	11,046	8,948	.....
Total output of reclaiming plant	31,203	26,159	19,127	76,489

TABLE III—Operating Costs per Net Ton Output

	1949 12 Mos.	1950 12 Mos.	1951 7 Mos.
Operating labor	$0.31	$0.33	$0.41
Overtime premium	0.08	0.08	0.09
Night work bonus	0.02	0.02	0.02
Service labor	0.07	0.05	0.04
Total Labor	$0.48	$0.48	$0.56
Material (Fuel oil used)	0.58	0.65	0.96
Supplies	0.05	0.04	0.03
Total Direct Charges	$1.11	$1.17	$1.55
Overhead Charges			
Direct repairs	$0.20	$0.20	$0.20
Power	0.14	0.14	0.14
Plant, general	0.26	0.26	0.26
Depreciation and property taxes	0.19	0.19	0.19
Total Overhead Charges	$0.79	$0.79	$0.79
Total Cost per Net Ton	$1.90	$1.96	$2.34

TABLE IV—Fuel Cost per Net Ton of Reclaimed Sand

	1949	1950	1951
Gallons oil per ton reclaimed	12.6	12.8	13.6
Cost per gallon	0.046	0.0514	0.0707
Fuel cost per ton	0.58	0.65	0.96

TABLE V—Comparison of Reclaimed and New Sand Costs and Savings

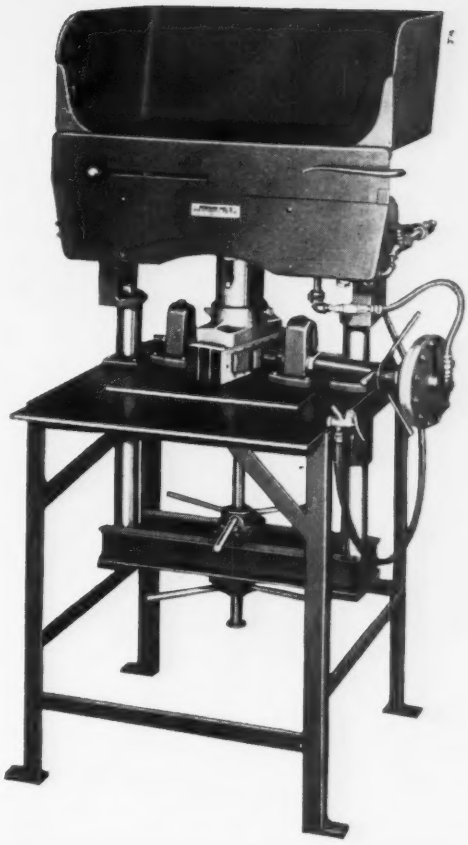
	GRADE "C" SAND Net Tons	Price	Amount	DORCHESTER SAND Net Tons	Price	Amount	TOTAL
1949							
New sand delivered and unloaded	12,414	$3.83	$47,545.62	18,789	$3.23	$60,688.47	$108,234.09
Reclaimed sand in bin	12,414	$1.90	$23,586.00	18,789	$1.90	$35,886.99	$ 59,473.59
Estimated savings		$1.93	$23,959.02		$1.33	$24,801.48	$ 48,760.50
Estimated saving per net ton sand reclaimed						$1.56	
1950							
New sand delivered and unloaded	11,046	$3.70	$40,870.20	15,113	$3.12	$47,152.56	$88,022.76
Reclaimed sand in bin	11,046	$1.96	$21,650.16	15,113	$1.96	$29,621.48	$51,271.64
Estimated savings		$1.74	$19,220.04		$1.16	$17,531.08	$36,751.12
Estimated saving per net ton sand reclaimed						$1.40	
1951 (to August 1)							
New sand delivered and unloaded	8,948	$4.12	$36,865.76	10,179	$3.37	$34,303.23	$71,168.99
Reclaimed sand in bin	8,948	$2.34	$20,938.32	10,179	$2.34	$23,818.86	$44,757.18
Estimated savings		$1.78	$15,927.44		$1.03	$10,484.37	$26,411.81
Estimated saving per net ton sand reclaimed						$1.38	
Grand Total Estimated Saving							$111,923.43

TABLE VI—Unit Operating Costs of Enlarged Plant

	Per Net Ton	
Labor including overtime premium and night work bonus	$0.31	
Fuel oil	0.63	
Supplies	0.02	
Total	$0.96	$0.96
Overhead charges		
Repairs	$0.15	
Power	0.14	
Plant, general	0.09	
Depreciation	0.11	
Total	$0.49	$0.49
Total Cost Per Ton		$1.45

Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



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8 OUTSTANDING FEATURES:

1. Large stationary work area.
2. Large sand supply hopper.
3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, vertical clamping attachment.
8. Actuating one handle clamps the core box, blows the core and releases the core box, in two seconds.

CAPACITY: Cores up to 5#

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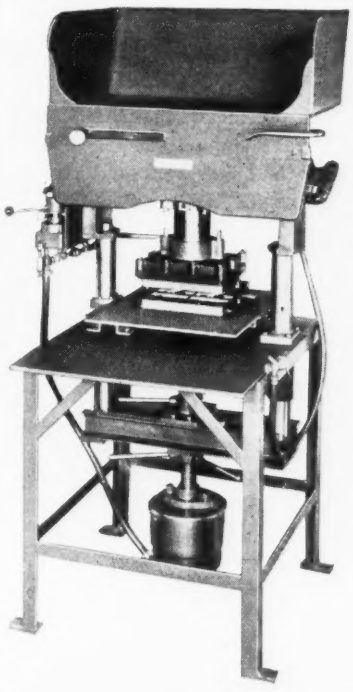
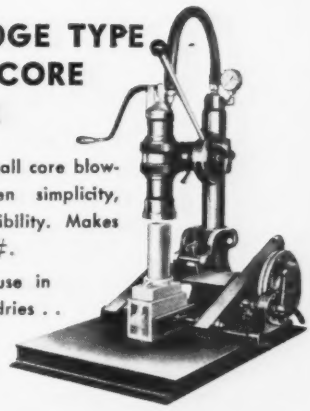
THE No. 2-D CORE BLOWER



A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

THE CARTRIDGE TYPE BENCH CORE BLOWER



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4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
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MR. WALTER A. ZEIS
Webster Groves, Missouri

(*Continued from page* 272)

fairly constant for the past 3 years.

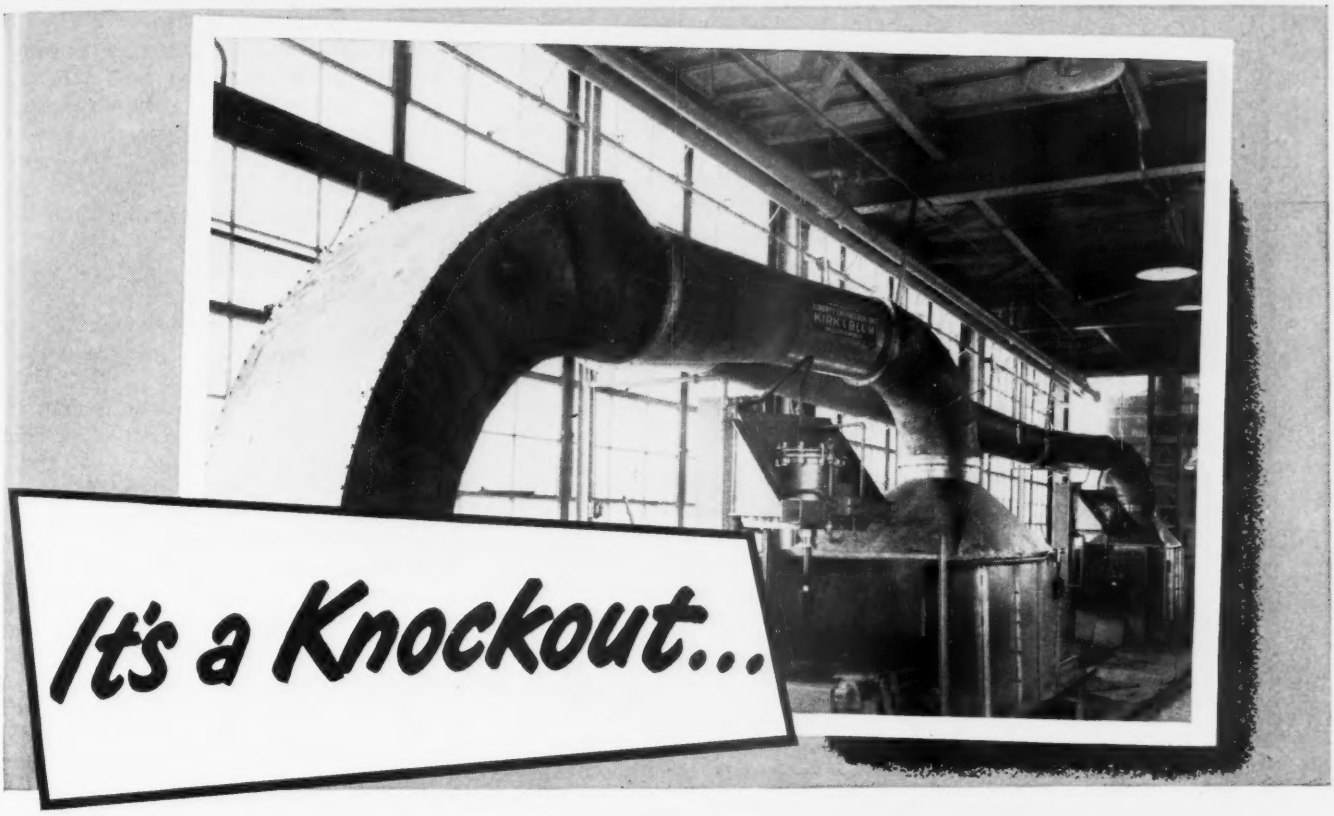
Estimated Saving—The saving as a result of the operation of the reclaiming plant can best be visualized in Table V, which shows for each year the cost of the sand reclaimed as compared with the cost had an equivalent tonnage been purchased at the current market price. This table indicates a total saving of $111,923 for the period. To this saving can very properly be added 25 cents per ton for drying the new sand when received and 20 cents per ton for on-site disposing of an equivalent tonnage of refuse sand, both of which costs are not included in the foregoing. These total 45 cents per ton or $34,420 for the period, so that the total saving for the period would be $146,343.00 ($34,420 plus $111,923 Total Estimated Savings, Table V). On this basis, the plant has paid for itself in less than 2½ years, a return of over 40 per cent annually on the investment of $130,675.20.

The 100 ton per day reclaiming plant is large enough to reclaim the sand resulting from a one-furnace operation. However, shortly after the Korean war started, the plant went on two-furnace operation, and it was necessary to purchase 3000 tons of new sand per month, in addition to the tonnage reclaimed. It was then decided to double the capacity of the plant, to 200 tons per day. This increase has been started and will soon be in operation. Changes consist mainly in replacing the present equipment with units of the same make but of larger capacity.

The two 5 x 5-ft Denver agitators are being replaced by 6 x 6-ft units. A new Allen cone 8 ft in diam replaces the present 7-ft cone, and a larger Dorr Classifier 5 ft wide by 18 ft 6 in. long replaces the present unit. An Oliver filter 6 ft in diam with 25 sq ft available filtration area is being installed. This unit will be placed over the Nichols furnace and a No. 2 Wilfley pump will be used to elevate the sand and water discharged from the Dorr Classifier into the filter. This eliminates the bucket elevator which has been a heavy source of maintenance as well as a cause of frequent interruptions in production due to breakdowns.

The Oliver filter will reduce the moisture in the washed sand to 7 per cent instead of the 20 per cent now being fed from the classifier into the Nichols furnace. It is felt that with this reduced moisture content, the furnace will have sufficient capacity to handle the increased tonnage with-

(*Concluded on page* 276)



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The photograph below shows the molding line, hoppers and supports which were also fabricated and installed by the Liberty Engineering Division. Other KIRK & BLUM systems are found in this same well known manufacturer's plant.

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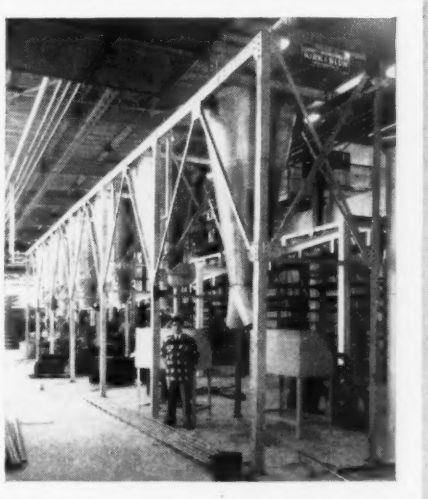

Fabricated and Installed by Liberty Engineering Div. The Kirk & Blum Mfg. Co., Indianapolis, Ind.

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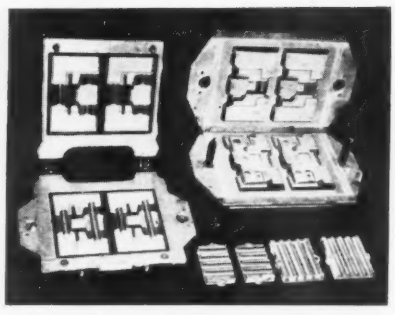

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Pressure Cast PRODUCTS

(*Concluded from page* 274)

out difficulty. The air classifier separating the reclaimed sand into the two grades will be increased in size.

The estimated cost of operation of the 200 ton per day plant is shown in Table VI.

This estimate is based on these assumptions:

1. The same sized operating crew will run the larger plant.
2. The total fuel consumption will be increased 25 per cent over the smaller plant.
3. The power cost will remain at the same rate per ton as that of the present plant.
4. Plant general expense based on 20 per cent of labor and 5 per cent of material cost.
5. Depreciation based on a monthly cost of $663.74, which includes the effect of the additional capital expenditure for the increased capacity.

It is estimated that the cost of these changes will be $36,850.00 and that on the basis of the above cost per ton, the increased plant will pay for itself in slightly over 7 months at the present rate of operation.

Conclusions—

1. Refuse sand resulting from steel foundry operations can be reclaimed by combined water-scrubbing and thermal treatment so that the product is equivalent to new sand.

2. The costs obtained indicate that it is economically attractive to install plants of this type in the steel foundry industry.

3. This method of reclamation is effective, regardless of the combination of binders and other additive materials used in the mold or core sand formulation.

4. Operation over an extensive period of time has shown that the reclaimed sand can be divided into two sands with grain-distribution characteristics corresponding to those of the two purchased sands. The reclaimed sands are stored in the same bins as the purchased sands and are used interchangeably with the new sand in compounding mold and core sand mixes with no change in formulation.

5. The continued period of operation has shown no change in the grain characteristics of the sands reclaimed as compared with the new sands.

6. The foundry refuse disposal problem has been alleviated greatly by the installation of this plant.

7. Sand storage for winter operations has been reduced to a minimum.

Editor's Note: This paper was presented at the 1951 Technical and Operating Conference of the Steel Founders' Society of America.

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• • •

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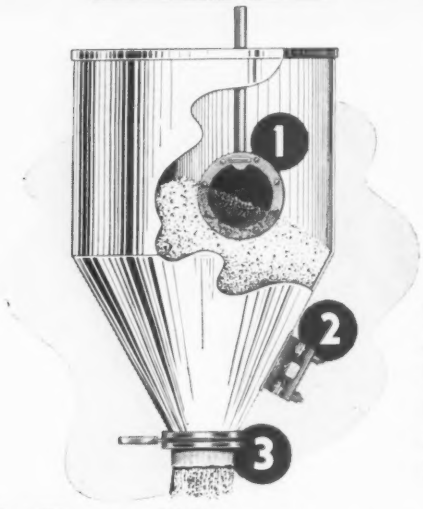

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Albion Malleable Foundry

(*Continued from page* 105)

flasks. Unit No. 1 handles short order cope and drag work. New jobs also are tried out here before going into production on one of the conveyor loops. Molds are made on a line of machines and move on roller conveyor pallets to the pouring and shakeout stations.

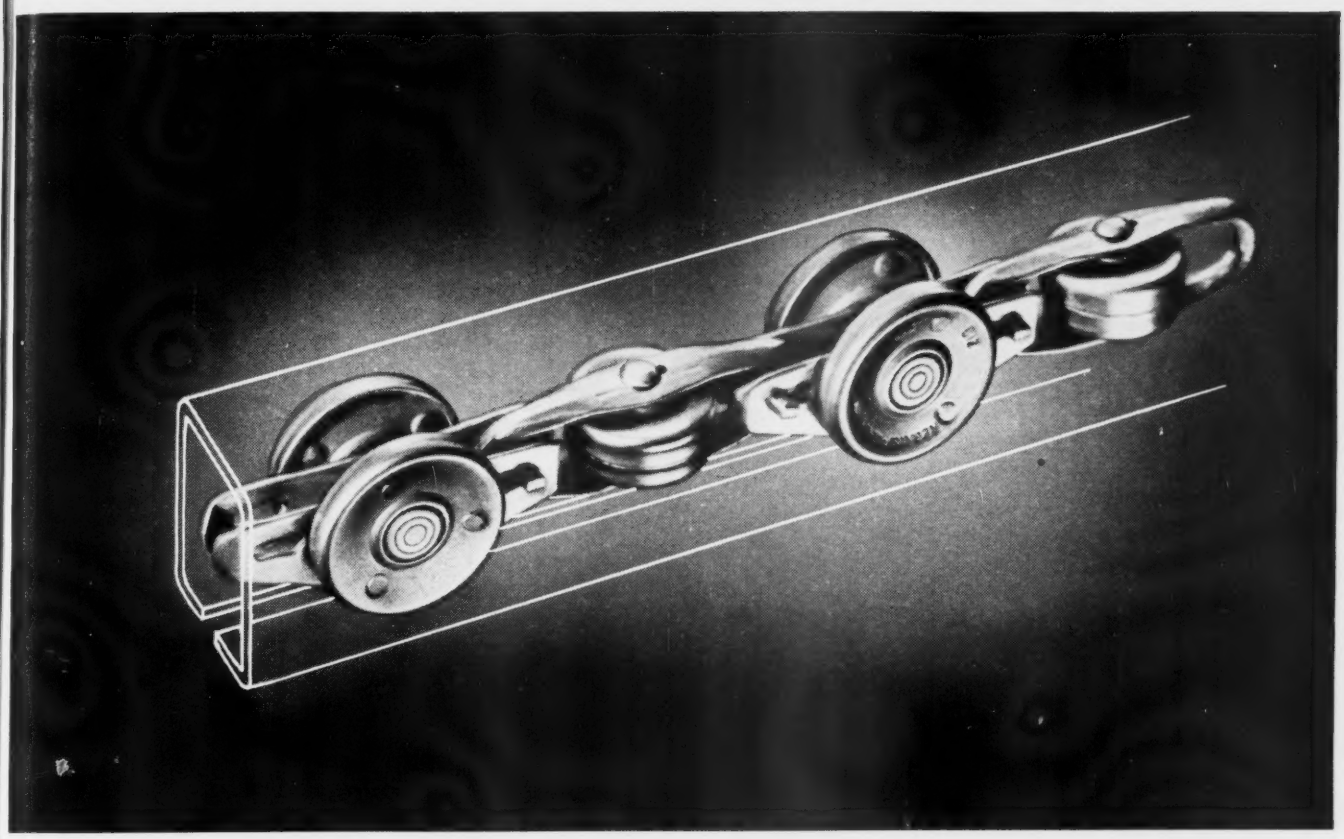
Molding units Nos. 2 and 3 are poured from 400-lb capacity cylindrical ladles with teapot spouts. This type of ladle is shown in Fig. 5. Approximately 10 to 12 molds are poured from one ladle on Unit No. 3, and approximately 20 molds per ladle on Unit No. 2. Pouring temperature is 2750 to 2800° F. Special pendulum type weight shifters with electric hoists are used to shift weights, which are 140 lb on Unit No. 3 and 60 to 70 lb on No. 2.

Cupolas Water-jacketed

Metal is melted in two cupolas, which operate every day, and is refined in two air furnaces. The cupolas have an 84-in. shell lined to 58-in. in the melting zone. One cupola is operated with hot blast, and the second cupola will be provided with that equipment in the future. Metal is tapped continuously from these water-jacketed, acid-lined cupolas at about 2750° F, the iron draining into the oil-fired furnaces, each of 60 tons capacity. One air furnace is used three days while maintenance is undertaken on the other. Air furnace stack gases are passed through a heat exchanger to provide the cupola hot blast. The air furnaces are used to reduce the carbon to 2.35 per cent standard, and to superheat the metal to 2900° F for transportation in 3000-lb ladles to the four mold line pouring stations.

Since the normal requirements of the four molding units are 40 tons per hour, and the melting capacity of the two cupolas combined is 33 tons per hour, a fine job of scheduling of the melting department is necessary. One cupola is tapped about 2 a.m. and the second is tapped several hours later. By the time the molding department starts, the air furnace has about 60 tons ready for pouring. This extra metal is utilized at the rate of about 7 tons an hour, although some gain in the hot metal supply is made during the lunch hour. The first cupola to be tapped has the bottom dropped a little after 2 p.m. and the work of repairing starts immediately so that the first heat may be tapped

(*Continued on page* 280)



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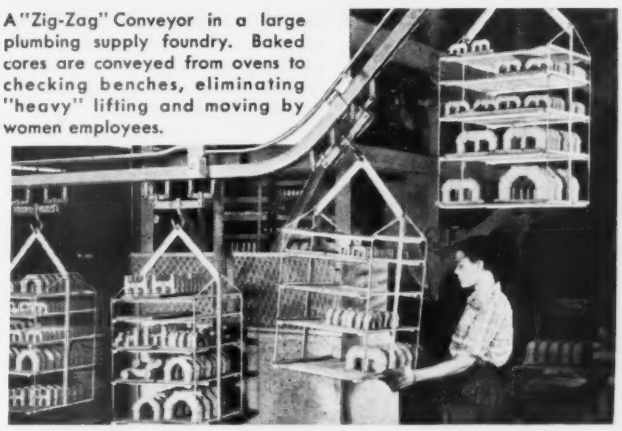
"Zig-Zag" Continuous Power Conveyor is a continuous motor-driven chain that operates *overhead* to give you far greater efficiency and economy in core-handling. The specially constructed chain runs in a steel tube-like track. It's designed to carry unit loads up to 125 pounds at speeds from 1 inch to 60 feet per minute. "Zig-Zag" can be installed in any plant to conform to space limitations, and it may be quickly and easily adapted to plant alterations. "Zig-Zag" requires a minimum of handling, utilizes "dead" space to release valuable floor area and valuable hands for other jobs.



A "Zig-Zag" Conveyor in a large plumbing supply foundry. Baked cores are conveyed from ovens to checking benches, eliminating "heavy" lifting and moving by women employees.

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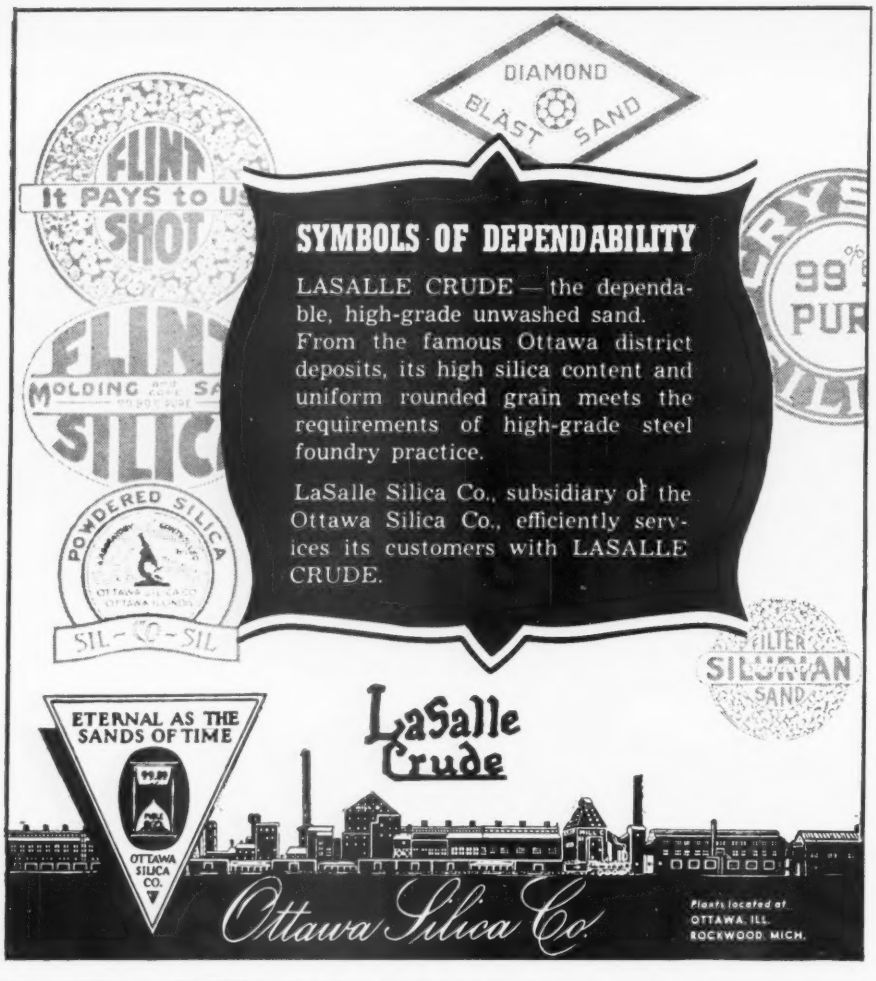
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(*Continued from page* 278)

less than 12 hours later. Metal as tapped has 2.30 to 2.40 per cent carbon, 1.58 to 1.68 silicon and 0.40 to 0.46 manganese.

The metal storage yard and the charging dock are particularly interesting. The yard is served by nearly a mile of railroad sidetrack, one section of which is equipped with a car scale for weighing all incoming carloads of materials. On either side of the cupola charging dock are large turntables of more than 100 tons capacity, one table holding sprue and the other purchased scrap. A belt conveyor handles sprue to the bin. These turntable bins make one revolution per hour.

Uses a Turntable

The dock proper has a large turntable with three weigh scales and three charging bucket openings, one of which is shown in Fig. 3. Miscellaneous purchased scrap is loaded at one station with an electromagnet. The turntable indexes to the next station where white iron returns and small amounts of pig and malleable iron are added. After indexing to the third station, coke and flux are added from overhead hoppers. The charging bucket is then handled from this point to the cupola charging door on a skip hoist, which is moved hydraulically from one cupola to another. Two men charge more than 300 tons a day with this equipment, each charge consisting of 3000 lb. The charge is made up of 50 per cent steel scrap, 40 per cent sprue, 7 per cent silvery pig iron of 10 per cent silicon content, and 3 per cent malleable scrap.

A control laboratory, Fig. 12, provides the melting department with almost continuous analyses of carbon, silicon, sulphur, and manganese in both cupola and air furnace metal. Periodic checks are made on phosphorus and inhibitors to graphitization, such as chromium. Because the chemical and metallurgical laboratory is located some distance from the melting department, pneumatic tubes are used to carry samples from the melting department to the laboratory. A telautograph is used to report results to the melters. As a further safeguard to the melting operation, the laboratory checks incoming raw materials, as well as coke, oil, ferroalloys, slag and furnace gases.

Castings are carried from the four shakeouts to the finishing departments in buckets, as shown in Fig. 8. These discharge automatically on a conveyor which crosses at the top of a large sliding bin. Gates, risers and

runners are removed and the castings discharged on the steel slide storage bin where they have time to cool. Operators at the bottom remove the castings, trim and inspect, sort and place them in tote boxes.

Castings are taken in tote boxes by lift trucks to one of the various annealing furnaces. The company operates three continuous type furnaces and six hood ovens. A small continuous furnace of 16 tons daily capacity operates on a 23-hour cycle. The furnace is controlled manually and the load is pushed 100 ft every 50 minutes, with 1000 lb entering and being discharged on each push. Natural gas is used, consumption being 2500 cu ft per ton of castings.

A second continuous furnace is 120 ft long and is fully automatic. The unit has a capacity of 43 tons per day on a 26-hour cycle. The furnace pushes every 40 minutes, charging and discharging 2400 lb per push. Baskets are made of alloy steel of 35 per cent nickel and 35 per cent chromium content. Natural gas input is 2500 cu ft per ton of castings. One of the largest units in use today, a continuous, radiant tube type furnace 150 ft long was installed as a part of the recent expansion program. This furnace has a capacity of 54 tons a day on a 28.8-hour cycle. Push time is 32 minutes, 2200 lb of castings being discharged per push. Gas input is 2000 cu ft per ton of castings. Alloy steel baskets have 20 per cent nickel and 25 per cent chromium.

Castings Stacked on Pallets

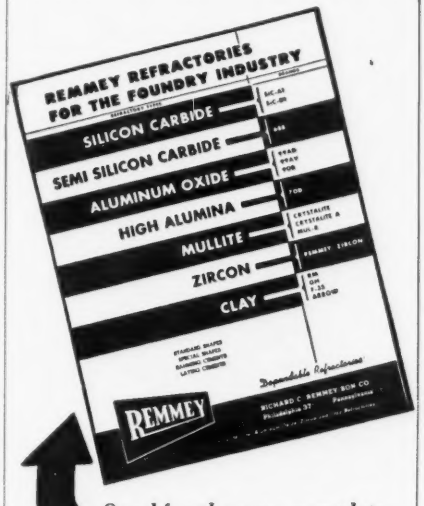
The six hood type ovens require seven bases, each with a hearth capacity of 20 tons. Cycle time is 39 hours. Castings are stacked on steel pallets containing 28 per cent chromium and 12 per cent nickel. A 30-ton gantry crane is used to handle the hoods and a bridge crane to handle the pallets.

Before the introduction of controlled atmosphere annealing, castings were packed with iron oxide or sand into pots stacked in batch furnaces, when a week or more was required to anneal. Improved melting control, permitting use of a relatively high silicon content to accelerate annealing, the elimination of large amounts of inert packing materials, and the mechanization of annealing furnaces have reduced heat treating cycles, as previously indicated. A typical cycle requires 4 hours to heat to 1750° F, at which temperature first-stage annealing takes place. This is accomplished in 9.3 hours. Castings then are cooled rapidly to 1400° F in 3.2 hours. Slow cooling at 5° F

Foundry Refractory

COSTS CAN BE CUT!

. . . Know the *right* refractory for the job!



Send for the new, complete bulletin on REMMEY Foundry Refractories—

. . . an informative, 2 color bulletin covering the entire line of REMMEY Refractories for the Foundry Industry. Silicon Carbide, Mullite, Aluminum Oxide, Ramming Mixes, etc.

A request on your company letterhead will bring it to *you!*

Dependable Refractories

REMMEY

RICHARD C. REMMEY SON CO.
Philadelphia 37, Pennsylvania

Manufacturers of Silicon Carbide, Mullite, Aluminum Oxide, Zircon and Clay Refractories

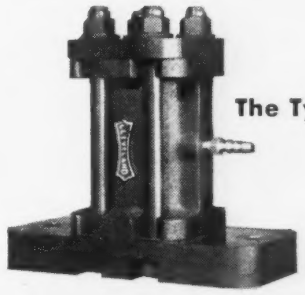
Keep It Moving IN THE FOUNDRY WITH THESE

CLEVELAND
Air Vibrators

Whether you need vibration in the form of gentle persuasion or heavy, hammer-like blows, we have the right air vibrator to do the job.

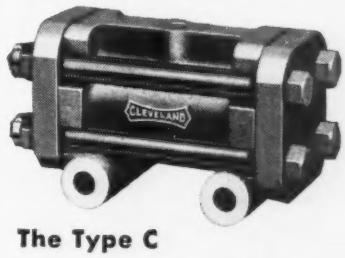
The Type SA

This vibrator is designed to remove matchplate patterns from sand molds and other foundry applications. A light weight, hard-hitting vibrator. Square body; fast, sure starting; smooth operation with full power. Obtainable with swivel connections to save hose . . . won't kink or buckle. 7 different piston diameter sizes.



The Type F

Insures continuous flow of sand from bins, hoppers, and chutes. Designed to eliminate plugging, arching and sticking. Directs a powerful blow at right angles against the side of the hopper. Made in 6 sizes for use on bins containing from one to several hundred tons. CLEVELAND Type JN spring-loaded, quick acting valves for efficient operation.



The Type C

A rugged vibrator designed for heavy molding and core machine production. Reversible heads held with over-sized alloy steel bolts, secured with stoplock nuts. 4 different piston diameter sizes.

All Cleveland Air Vibrators are backed by our 27 years of quality engineering.

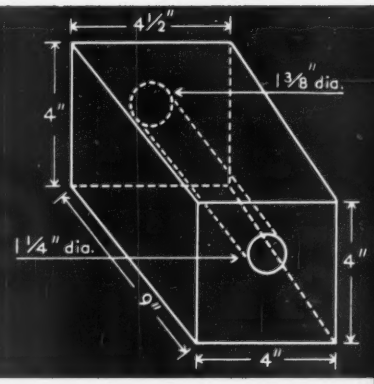
Folder No. F-351 gives further details.

BIN Stuck lately?

THE CLEVELAND VIBRATOR COMPANY

2788 Clinton Ave. • Cleveland 13, Ohio

How to eliminate slag hole failures



Operators of continuous pour cupolas report 20 or more hours steady service from CARBOFRAX silicon carbide blocks —with practically no change in hole size. Result: no slag hole failures, no costly shutdowns.

Get a trial order of these durable blocks. The standard size shown is available for immediate shipment. Other sizes can be made from stock molds. Further details gladly furnished. Address Dept. V-92.

Slag hole blocks by

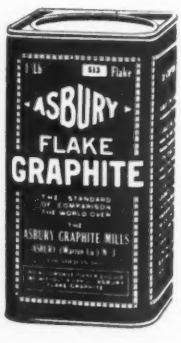
CARBORUNDUM

Trade Mark

Refractories Division The Carborundum Company Perth Amboy, N. J.

"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company.

THREE STEPS TO BETTER CASTINGS *with ASBURY GRAPHITE PRODUCTS:*



KLEEN-A-KAST
an outstanding shake-on facing

PLUMBAGO CORE WASH
Better Finish — Easier Cleaning

PIPE REDUCER
CARBON & NON CARBON

The Asbury Graphite Mills, Inc.

MAIN OFFICE & WORKS
ASBURY, NEW JERSEY

per hour permits second-stage annealing and completion of the cycle. A careful balance of CO and CO_2 is maintained by introduction of air or a prepared gas to the furnace.

After annealing, the castings are cleaned in six tumbling type blasting machines especially arranged to permit mechanical handling. The machines, which may be seen in the background of Fig. 9, have a capacity of 15 tons per hour. Castings are now loaded into hoppers, installed since the photograph was taken, in front of the machines by traveling crane and magnet and are discharged into the blast units by gravity. After cleaning, the castings are rolled out onto a belt conveyor and carried to storage bins in the finishing department on the mezzanine floor. The six cleaning machines handle approximately 220 tons in an eight-hour day. Shot consumption is about 100 lb per hour per machine.

Gates Are Removed

Gates are removed by shearing, grinding and milling. Fifty per cent of production is handled on six mechanical and two hydraulic shearing machines or presses. Castings then are pressed to close limits on eight hydraulic machines, the largest exerting a pressure up to 750 tons. In the several finishing operations, castings are moved from bins by gravity, to and from different operating stations on chain and belt conveyors, and by magnets and by fork trucks. Castings requiring painting are hung on chain conveyors and carried through paint tanks and through a drying cycle.

Castings then are transported to the shipping dock which has facilities for both rail and truck shipment. Much of the production is delivered in the big fleet of company-owned, red and white trucks carrying the Circle A trademark.

The compressor house has five compressors; the largest has a capacity of 1200 cfm. The company maintains a standby supply of butane gas to permit operation for several weeks in case the natural gas supply is inadequate or cut off. The well equipped pattern shop is for maintenance only, as all patterns are purchased from commercial shops.

Equipment maintenance is extremely important to any mechanized foundry operation. Albion has developed a highly successful program of preventive maintenance which, in part, involves periodic inspection and cleaning of vital parts, rigidly ad-

(*Concluded on page* 284)

YOU'LL DO A BETTER JOB

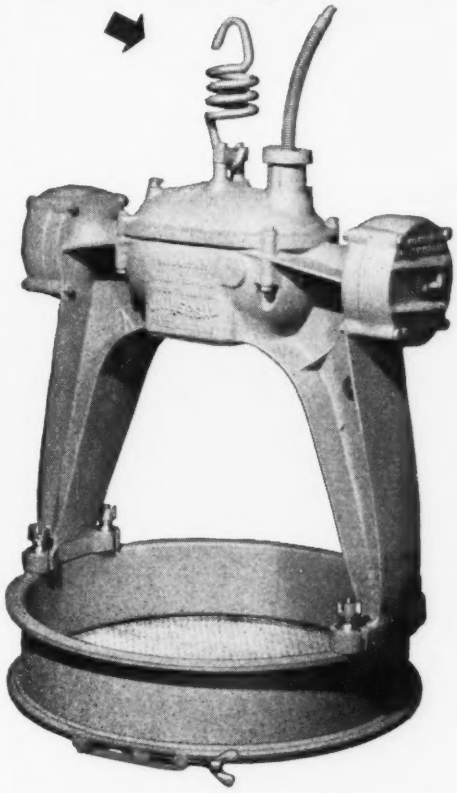
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

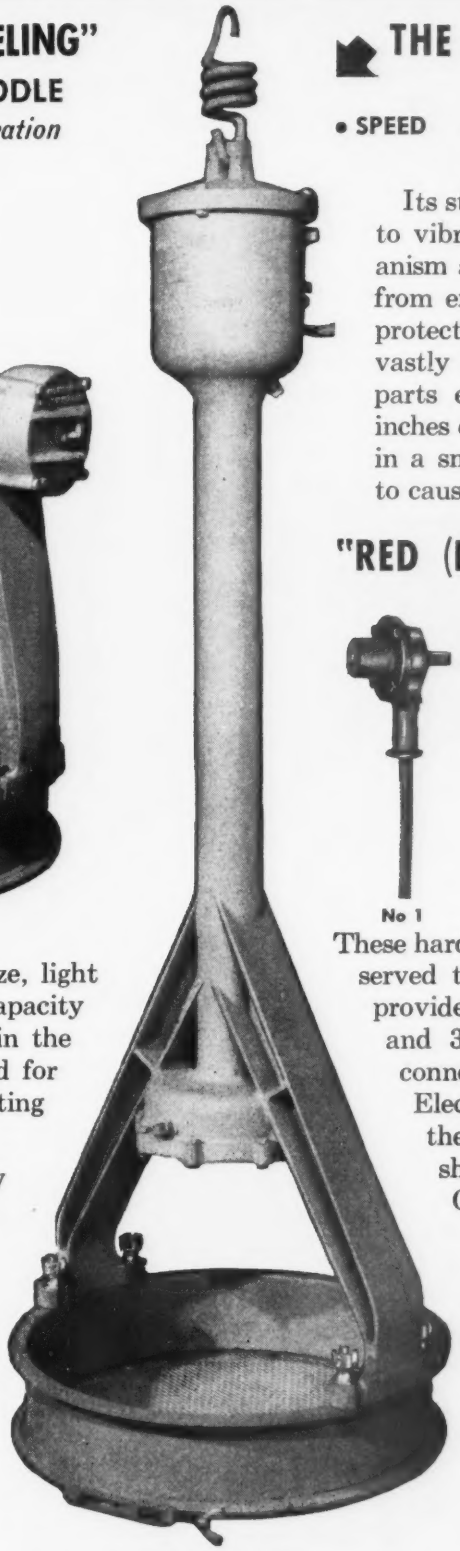


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



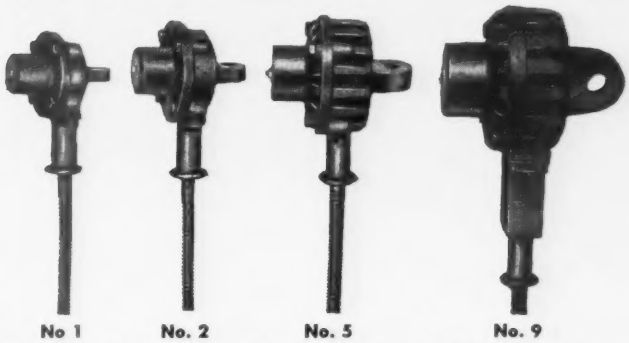
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

SEMET-SOLVAY FOUNDRY COKE

"for Better Melting"

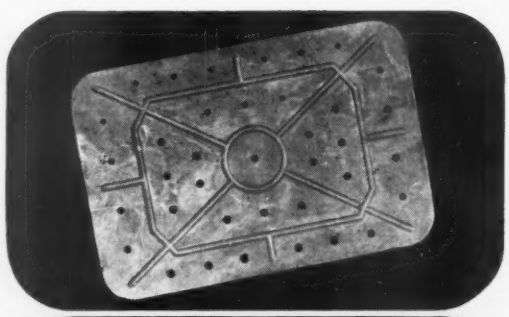
What is "better melting"? It's melting your iron hotter, cleaner, faster. It's what you get when you use Semet-Solvay Foundry Coke in your cupolas. It is responsible for better castings and lower scrap losses.

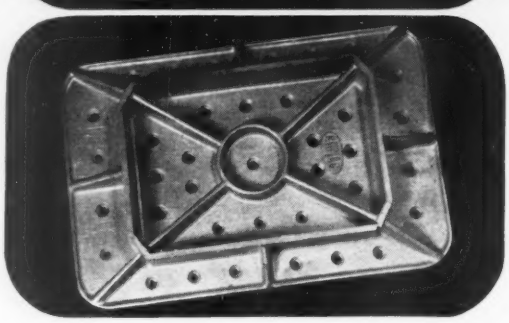
SEMET-SOLVAY DIVISION
Allied Chemical & Dye Corporation

CINCINNATI · DETROIT
BUFFALO · CLEVELAND
In Canada: SEMET-SOLVAY COMPANY, LTD., TORONTO

for Better Melting

MAGNESIUM BOTTOM BOARDS





AM-MAG True Level bottom boards reduce molder fatigue because they are light in weight and are easy to handle. Rigid design and proper venting produces castings true to pattern. Eliminates sagging and swelling.

AM-MAG bottom boards outlast wood boards many times over, soon pay for themselves. Gone are the splintered, warped and burnt into wood boards with their high maintenance costs.

EXCLUSIVE. Large size AM-MAG bottom boards can be fitted with replaceable hard-oak runners for use with roller conveyor or mold handling systems. The wood runners provide greater stability on larger mold sizes and prevent excessive abuse on mold handling systems.

FOUNDRY EQUIPMENT & SUPPLY CO.
2970 WEST GRAND BLVD. DETROIT 2, MICHIGAN

(*Concluded from page* 282)

hered to lubricating schedules, and regular replacement of certain parts subject to unusual wear or stress. In addition to a well equipped maintenance department and attendant stock room, area maintenance men are placed in each department and provided with mobile units for tools, welding and other equipment.

The company spends considerable time and effort in an experimental laboratory for studying methods. Many improvements in practice and in equipment have developed from these studies.

Every precaution is taken to prevent fire, and a well trained fire fighting crew with mobile equipment is maintained. Special attention is given to promoting safety practices, and a well equipped medical department handles first aid. A lunch room is run by an employees' committee, and canteens are operated from 6:30 a.m. to 1 p.m. and from 5:30 p.m. to 9 p.m.

Special mention should be made of the employees' entrance. Not only is it attractive and in close proximity to the parking lot, but it has sufficient covered area to keep employees from the weather in case of storm. Uniformed guards are on duty continuously.

Visiting this fine plant and talking to the Albion Malleable family leaves the impression that both management and employees are progressive, interested in their jobs and proud of their accomplishments.

New ISEA Officers

Edison L. Wheeler of the Wheeler Protective Apparel Co., was elected president of the Industrial Safety Equipment Association at that group's annual meeting on June 25-27 at the Homestead, Hot Springs, Va. Also elected at the meeting were S. C. Herbine, Willson Products Co., vice president; J. B. Davies, Mine Safety Appliance Co., and F. R. Davis, Jr., Davis Emergency Equipment Co., trustees.

J. A. Brewer, Industrial Gloves Co., and G. M. Glidden, Acme Protection Equipment Co., carry over as members of the board, and Charles H. Gallaway, American Optical Co., ISEA president for the past two years, continues as a member of the board for another year. In addition Mr. Gallaway has been elected to the Board of Directors of the National Safety Council. In this capacity he will serve as a liaison between the ISEA and the Council.

...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 251

CYLINDER POWER: Hanna Engineering Works, 1765 Elston Ave., Chicago 22—Bulletin illustrates 16-cylinder powered movements and shows 21 actual applications. Text describes how cylinder power can be utilized to speed production on all types of machines and equipment. Hydraulic or pneumatic cylinders can be used to push, pull, lift, press, clamp and control. The bulletin also illustrates many of the company's hydraulic and pneumatic cylinders, manual and control valves.

For More Details Circle No. 90—Page 251

DIRT EJECTORS: Selas Corp. of America, Philadelphia 34—Two revised bulletins, SC-1007-1008, pertain to equipment for the removal of water, water-oil emulsions and dirt from compressed air and gas lines. The equipment operates without moving parts, using ceramic filter candles to clean the air or gas without significant pressure drop. One series covers the range of 10 to 75 cfm; the second series from 100 to 500 cfm. Liquids are ejected continuously and automatically. The filter candles are removed readily for cleaning.

For More Details Circle No. 91—Page 251

CUTOFF MACHINES: Tabor Mfg. Co., 6225 Tacony Street, Philadelphia 35—Bulletin presents facts and figures on a line of abrasive cutoff machines ranging in size and capacity from the baby unit equipped with a 5-hp motor to the big universal 20-hp type which is claimed to cut at practically any angle on almost any shape casting. Information includes complete specifications, cutting capacities, working area for units designed to cut wet or dry, bevel or right angle.

For More Details Circle No. 92—Page 251

WASHROOM ECONOMY: Bradley Washfountain Co., North 22nd and Michigan Sts., Milwaukee 1 — New catalog describes and illustrates advantages of group washing fixtures for factories, schools and institutions of all kinds. It indicates important savings in water consumption, floor space, installation and maintenance can be achieved with the equipment. Data on comparative costs and advantages of group washing are included.

For More Details Circle No. 93—Page 251

SHELL MOLDING: Monsanto Chemical Co., Plastics Division, Industrial Resins Department, Springfield 2, Mass.—Illustrated 28-page booklet is claimed to represent as complete and factual a text on the shell molding process as has yet appeared. Its contents page lists the following discussions: Foreword, historical background, synopsis of the shell molding process, merits of the proceess, equipment requirements, engineering equipment for shell molding, materials requirements, sand; material requirements, thermosetting binders; release or parting agents; practical considerations of shell molding, and process limitations.

For More Details Circle No. 94—Page 251

COMBUSTION EQUIPMENT: Hauck Mfg. Co., 124-136 Tenth Street, Brooklyn 15, N. Y. Catalog 52 gives a condensed and pictorial review of oil and gas combustion equipment for production, construction and maintenance application in industrial plants. An easy means of standby oil firing for industrial plants having seasonal shortages of natural gas is explained in catalog 715, which also illustrates typical applications of Hauck gas burner nozzles.

For More Details Circle No. 95—Page 251

THERMOCOUPLES: Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44—Catalog EN-S2, offers the latest information on available couples and couple assemblies for general application and includes a section on special couples for plant and laboratory. In a simplified tabular arrangement, the publication lists the accuracy limits of couples, the temperature and physical limitations of thermocouple and protecting tube materials.

For More Details Circle No. 96—Page 251

REFRACTORIES: Illinois Clay Products Co., Joliet, Ill. — A new folder describes a complete line of insulation and refractory products, including a high-temperature vermiculite insulation available in block, brick, coating, granules and concrete. Also new types of chemically bonded refractory brick and a complete line of fire clay brick, fire clay flour, tap hole mix and ground fire clay.

For More Details Circle No. 97—Page 251

FOUNDRY EQUIPMENT: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee 1—Illustrated bulletin 25B6092C covers equipment for shakeout, sand conditioning, casting cleaning, sand reclamation, as well as jaw crushers; motors, drives and controls; cupola blowers; arc furnace transformers and controls; a dielectric coredrier, and power generation and distribution equipment.

For More Details Circle No. 98—Page 251

AERATOR: National Engineering Co., 549 West Washington Blvd., Chicago 6—Complete data including design details, photos and specifications of a new aerator for use with the company's muller in sand handling and preparation, are presented in bulletin 484-A. Assembly consists of in-

COST CONTROL
WESTOVER ENGINEER
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FOUNDRY MANAGEMENT CONSULTANTS
3110 W. FOND DU LAC AVE., MILWAUKEE 10, WIS.

NOMAD
CONVEYOR SYSTEMS

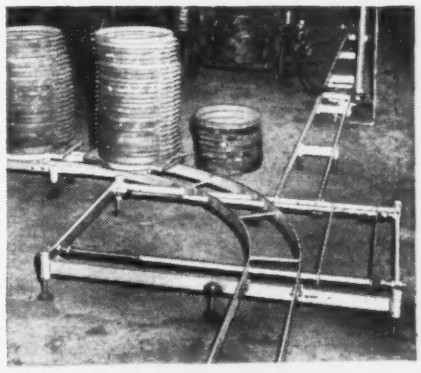


Illustration of Stack Molding Application

THESE ARE NOMAD'S REVOLUTIONARY FEATURES:

1. **No Vibration During Travel:** Bottom board location of rollers and smooth, level track, guarantee against vibration.
2. **Effortless Moving:** Twin rows of ball bearings in the rollers permit moving with minimum friction.
3. **Self Cleaning:** Entire assembly is constructed to shed sand accumulation. Top rail is self-cleaning.
4. **Low Maintenance Cost:** Non-lubricating bearing eliminates greasing and oiling. Cleaning time minimized by self-cleaning open construction.
5. **Low Initial Cost:** Case histories show offset of initial cost in only three months.

Whatever the space and mobility problem, Nomad conveyor facilities can be assembled in a wide variety of combinations to bring a new and profit making efficiency to any foundry layout.

Manufactured by
NOMAD FOUNDRY EQUIPMENT
DIVISION OF
WESTOVER ENGINEERS
3110 W. FOND DU LAC AVE.
MILWAUKEE 10, WIS.

dividual combing bars mounted on a hexagonal shaft. The first and last combing bar are secured to the shaft while the others are loose. Leading edge of the bar is hard surfaced. While the packaged conversion unit includes a set of bearings, existing bearings can be used as spares. Existing V-belt drives can be used.

For More Details Circle No. 99—Page 251

BOTTOM BOARDS: Burr Oak Brass & Aluminum Division of Keyes-Davis Co., Burr Oak, Mich.—Text and illustration in a four-page folder describe features of aluminum bottom boards and jackets. Bottom plates rigidly bridged for stability and strength are properly vented, provided with hand pads and rolled edges. Jackets have heavy doweled and bolted corners, heavy metal reinforcing, rugged rib construction, and replaceable sides.

For More Details Circle No. 100—Page 251

MECHANIZATION: Link - Belt Co., 307 North Michigan Ave., Chicago 1—Book 2439, representing a selection of actual case histories, tells and shows how a foundry can be mechanized for increased production, better castings and improved working conditions.

For More Details Circle No. 101—Page 251

DRUM SANDERS: Carborundum Co., Niagara Falls, N. Y. — Short strips of coated abrasive torn off standard rolls are secured in place around the new drum sander. When the arbor nut is run up tight against the locking cone washer, the unit becomes the same as a solid wheel. Worn abrasive strips may be replaced in a few seconds.

For More Details Circle No. 102—Page 251

CERAMIC SHAPES: American Lava Corp., Chattanooga 5, Tenn.—Illustrated bulletin 522 provides descriptive data and size specifications on refractory ceramic shapes, including strainer cores, gate tubes, cut-off cores and troughs.

For More Details Circle No. 103—Page 251

DIE CASTING—Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12—Bulletin describes and illustrates company's model 400 high-pressure hydraulic die casting machine for aluminum, brass, magnesium, zinc, lead and tin alloys. Complete specifications are given.

For More Details Circle No. 104—Page 251

COMPRESSORS: Davey Compressor Co., Kent, O.—Bulletin E-237 describes all types of 105 cfm compressors, gasoline, diesel and electric powered trailers, truck-mounted units and industrial stationary machines are listed and illustrated in detail. Complete mechanical specifications are included in a handy reference table.

For More Details Circle No. 105—Page 251

TESTING MACHINES: Tinius Olsen Testing Machine Co., 1118 Easton Road, Willow Grove, Pa.—Bulletin 44 on low-cost hydraulic universal testing machines is devoted to a description of Olsen *L* type testing machines in five capacities from 60,000 to 400,000 lb. Operating details are included with specifications.

For More Details Circle No. 106—Page 251

FINISHING COMPOUND: Blue Magic Chemical Specialties Co., 2135 Margaret St., Philadelphia 24—Bulletin 1 describes new chemical in concentrated paste form for descaling, roughing, deburring, cleaning and finishing brass, bronze, copper, gold, silver and certain other nonferrous parts by barrel tumbling.

For More Details Circle No. 107—Page 251

VISES: Desmond-Stephan Mfg. Co., Urbana, O.—Wide variety of vises for wood and metal working, industrial and home use are described and illustrated in catalog 60. Ordering for particular needs is made easier through quick identification of vises by models and sizes. Ordering of repair parts is facilitated by a complete listing with drawings.

For More Details Circle No. 108—Page 251

SCALES: Howe Scale Co., Rutland, Vt.—Condensed scale catalog 11 includes a selection of 1000 popular standard scales measuring weights from 1/64-oz to 400 tons. Special features include the beam indication, tape-drive dial, weightograph projection and the teleprint electronic remote weight recorder. Catalog also shows a page reference to company hand trucks.

For More Details Circle No. 109—Page 251

MAINTENANCE COATINGS: United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12—Bulletin describes various industrial products for skidproofing, rust prevention, painting over damp areas, weatherproofing and decoration of exterior masonry, interior waterproofing, painting over hot surfaces, protection against acids, chemical fumes and other special maintenance work.

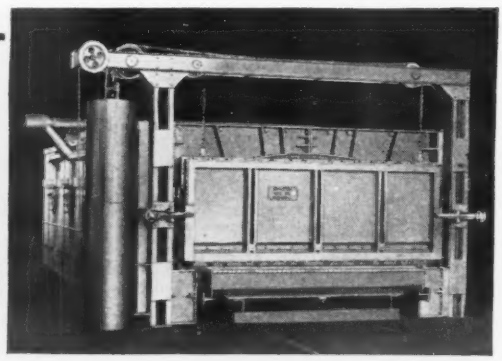
For More Details Circle No. 110—Page 251

SERVICE BOOKLET: Westinghouse Electric Corp., Box 2099, Fittsburgh 30—Booklet B-4766 presents a sound maintenance program based on the use of renewal parts, repair service plants, engineering and field service. Photographs show the special skill, testing devices and repair equipment available through strategically located repair plants. Many improved design renewal parts are illustrated.

For More Details Circle No. 111—Page 251

BUCKETS: Blaw-Knox Co., Bucket Dept., Pittsburgh 30—New 44-page bulletin 2392 illustrates and describes four rope symmetrically designed buckets used primarily on bridge cranes, with man trolleys, with fleet

(*Continued on page* 288)



FOR NORMALIZING ANNEALING AND ALL HEAT TREATMENT OF CASTINGS

JOHNSTON CAR BOTTOM FURNACES

You'll get clean heating, high efficiency, and fuel economy in the Johnston furnaces. Engineering experience is also apparent in their smooth mechanical operation—in their roller bearings in car and door hoist shafts, and power operated car pullers. Write today for bulletin F-240.

JOHNSTON EQUIPMENT FOR THE FOUNDRY

• MELTING FURNACES • HEATING TORCHES • LADLE HEATERS
• HEAT TREATING FURNACES • BURNERS, BLOWERS, CONTROLLERS

OVER THIRTY YEARS EXPERIENCE IN DESIGN AND MANUFACTURE.

THE JOHNSTON LINE — SAFETY — DEPENDABILITY

JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.

ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

Mighty Little Giant for

HIGH SPEED PRODUCTION OF SMALL & MEDIUM CASTINGS

CAST-MASTER MODEL No. 10

Unsurpassed For Top Production of Uniform Quality Castings!

Specifications On Request!

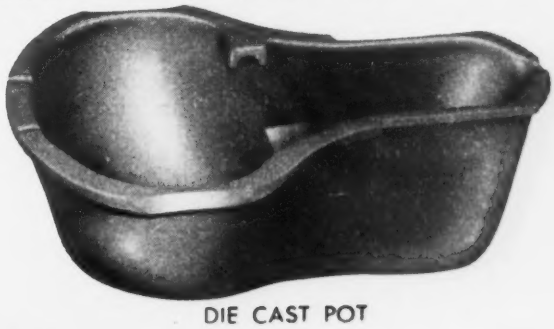
CAST-MASTER *Die Casting Machines*

— CAST-MASTER, INC. • 2123 HAMILTON AVE., CLEVELAND 14, OHIO —

MELTING POTS—Ingot Molds

FOR NONFERROUS METALS FROM ACME SPECIAL FORMULA

SPOUT POT NO. 550A



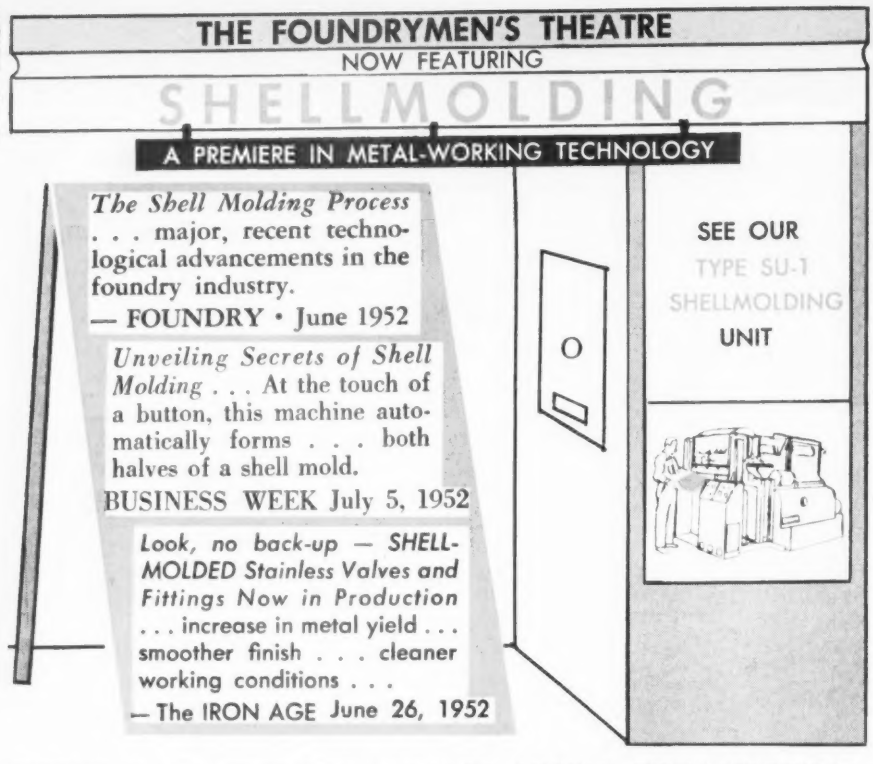
DIE CAST POT

HOLDING BOWL NO. HP7001

WRITE FOR *SCHEDULE OF 40 SIZES*

ACME FOUNDRY COMPANY

2502 22nd Street DETROIT 16, MICH. *Phone:* Tashmoo 5-2404


THE FOUNDRYMEN'S THEATRE
NOW FEATURING
SHELLMOLDING
A PREMIERE IN METAL-WORKING TECHNOLOGY
The Shell Molding Process . . . major, recent technological advancements in the foundry industry.
— FOUNDRY • June 1952
Unveiling Secrets of Shell Molding . . . At the touch of a button, this machine automatically forms . . . both halves of a shell mold.
BUSINESS WEEK July 5, 1952
Look, no back-up — SHELL-MOLDED Stainless Valves and Fittings Now in Production . . . increase in metal yield . . . smoother finish . . . cleaner working conditions . . .
— The IRON AGE June 26, 1952
SEE OUR
TYPE SU-1
SHELLMOLDING
UNIT

WHAT IS ALL THIS HULLABALOO ABOUT SHELLMOLDING?

In spearheading the industrial application of this process, we've been preoccupied with refining our basic techniques and perfecting the automatic machinery which, together, have established the economic feasibility of shellmolding. May we, at this point, therefore, add a few remarks of our own to the general chorus on the subject?

Shellmolding has proved itself, in important segments of the American metal-working industry, to be a successful means toward an end. That end is ***the casting of metal more economically*** and at that, with a smoother finish, to closer tolerances, and of greater complexity than is possible by traditional sand-casting methods.

These objectives can not be achieved just by going out and ordering a molding machine that may — or may not — be suitable for turning out the size and shape and number of molds you need to meet these requirements. There's a lot more to the production of competitively saleable shellmolded castings than that.

Simple as it looks, simple as it sounds, it takes a tremendous amount of engineering know-how — of the kind that can be independently acquired, starting from scratch, only by years of research and experimentation, and that is otherwise available only from those who already have behind them . . . ***proven records of successful experience***

— developing the basic process itself

— engineering and constructing machinery and auxiliary equipment *around that process*

— designing and building patterns specifically for use in that process, and

— producing shellcastings under actual operating conditions *at a saving to the foundry.*

We suggest that you get the machinery, the tools, and the engineering-background know-how you need. So far as we know, you can get it, guaranteed on a performance basis, only from—

SHELLMOLD & MACHINE CO., INC.
70 PINE STREET, NEW YORK 5, N. Y.

981

(*Continued from page* 286)

through sheave type trolleys, also on unloading towers and on boom type and overhead cranes. Performance data and comparison of cargo dispatch and discharging vessels, barges and railroad cars are included. Helpful information and diagrams are presented on reeving, arrangement of cables, cable life, and antifriction bearings.

For More Details Circle No. 112—Page 251

INSTRUMENTS: Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44—Catalog 5000 describes the principal instruments, control devices and related components manufactured by the company. Specifications of approximately 100 measuring and control instruments and valves are outlined.

For More Details Circle No. 113—Page 251

CONTROL THERMOMETERS: Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44—Catalog 6482 describes recording and indicating electric control industrial thermometers used for temperature control on drying ovens, cooking kettles, lumber kilns and plating tanks. Information on available switching action, chart and scale ranges, dimensions and bulb and tubing variations is included.

For More Details Circle No. 114—Page 251

VIBRATING CONVEYORS: Jeffrey Mfg. Co., Columbus 16, O.—Catalog 849 describes and illustrates mechanical vibrating conveyors for effectively and economically conveying large, medium and light tonnages of material. An extensive application is in foundries for handling shakeout sand from continuous mold conveyor systems, roller conveyor systems and in the handling of hot castings.

For More Details Circle No. 115—Page 251

HEATERS: Dravo Corp., Heating Dept., Fifth & Liberty Aves., Pittsburgh 22—Revised bulletin 523-B contains information on the use of heaters for eight applications besides space heating. Items include functional heating, process drying, temporary heating, medium temperature drying, tempering makeup air, drying vehicles after washing, crop drying, and integration with air conditioning systems. Heaters are direct fired either with gas or oil, and are supplied in standard output capacities ranging from 400,000 to 2,000,000 Btu per hour.

For More Details Circle No. 116—Page 251

GRAPHITIZATION RESEARCH: Edward Valves, Inc., subsidiary of Rockwell Mfg. Co., East Chicago, Ind.—Ten-years' research findings covered in 12-page booklet discuss the graphitization phenomena encountered in systems operated at elevated temperatures. Booklet also contains

eutectic diagrams and graphs illustrating the effect of temperature, time, and other variables on graphitization. Separate sections cover the effect of chemical composition, deoxidation practice, prewelding microstructure, welding conditions, stress and strain.

For More Details Circle No. 117—Page 251

ROOF REPAIR: Hallemite Mfg. Co., 2446 West 25th St., Cleveland 13—Two folders recently issued dwell upon the composition of material used for constructing new and repairing old roofs. Specifications explain and illustrate, step by step, exactly how a properly constructed one or two-ply built-up roof is installed. Table shows the amount of materials required per 100 sq ft.

For More Details Circle No. 118—Page 251

PIPELINE STRAINERS: V. D. Anderson Co., 1935 West 96th St., Cleveland 2—Bulletin 252 describes the complete line of self-cleaning pipeline strainers in sizes from ¼ in. to 3 in. Features include discussion of sediment control in steam traps, reducing valves, air tools, pumps, temperature regulators, etc. Illustrations show application of the strainer.

For More Details Circle No. 119—Page 251

MELTING POTS: American Car & Foundry Co., 30 Church St., New York 8—Four-page pamphlet deals with a low-nickel-chromium alloy cast iron for pots in use in aluminum foundries, die casting plants, battery plants and smelting works. The metal also is used for ingot molds for all nonferrous metals, utility castings, goosenecks, etc. Tables show dimensions, weight and holding capacity of stationary or holding pots from 3 to 92 in. diam.

For More Details Circle No. 120—Page 251

PROPELLER FANS: Manufacturers Equipment Co., 242 Madeira Ave., Dayton 4, O.—Five types of 30 to 48-in. portable fans and twenty models of 27 to 72-in. exhaust fans are described, illustrated and rated in bulletin 100. Although the company specializes in clay working equipment, the fans are applicable to general cooling and ventilating purposes wherever large volumes of air are to be moved.

For More Details Circle No. 121—Page 251

BIN LEVEL INDICATOR: Bin-Dictator Co., 13946 Kercheval Ave., Detroit 15—Catalog describes and illustrates a complete line of bin level indicators widely used to indicate the level of granular and pulverized materials in tanks, silos, hoppers and bins. Numerous wiring diagrams form a reference manual for installation and maintenance crews. Also described is an aerator unit which introduces low-pressure air into dry, finely ground materials which are inclined to pack and bridge.

For More Details Circle No. 122—Page 251

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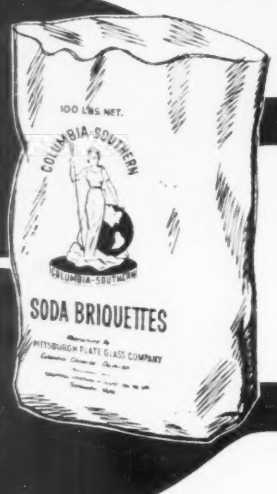

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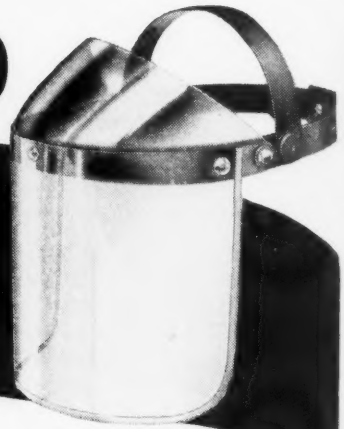

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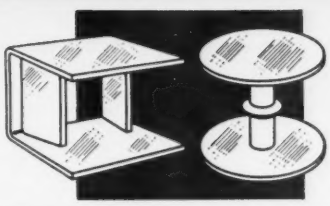

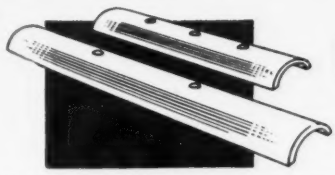

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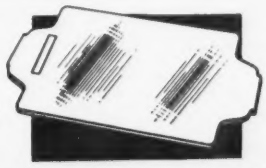

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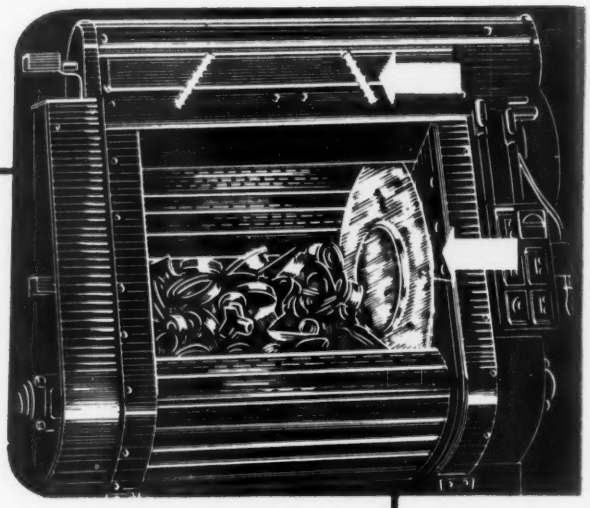

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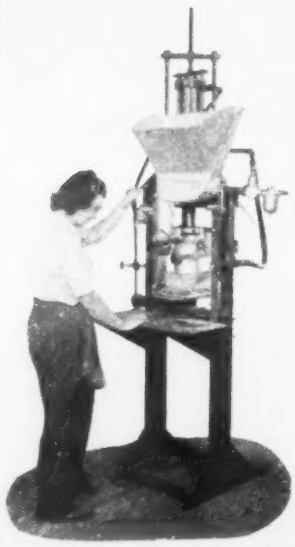

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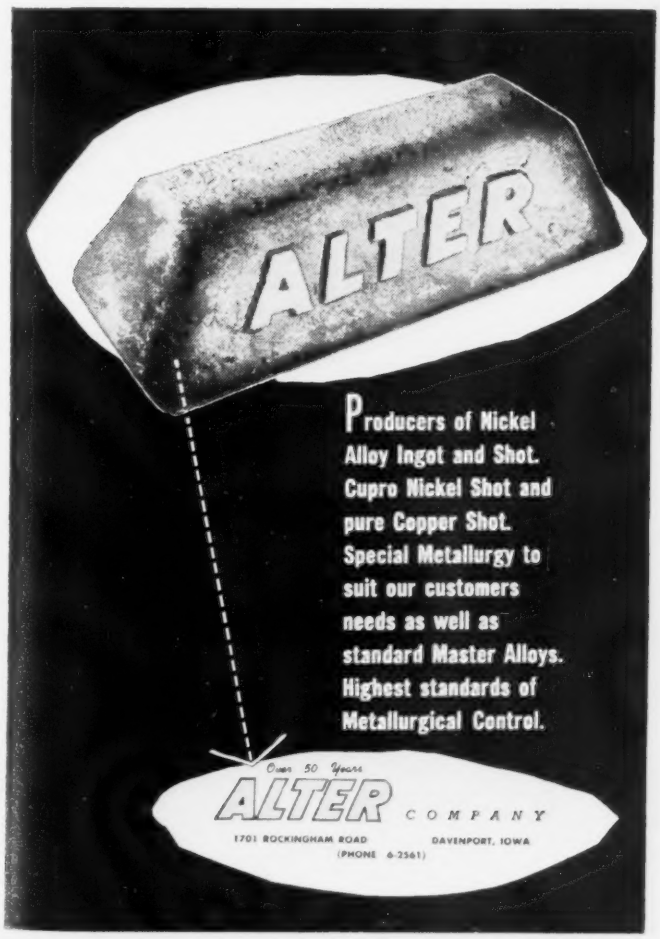
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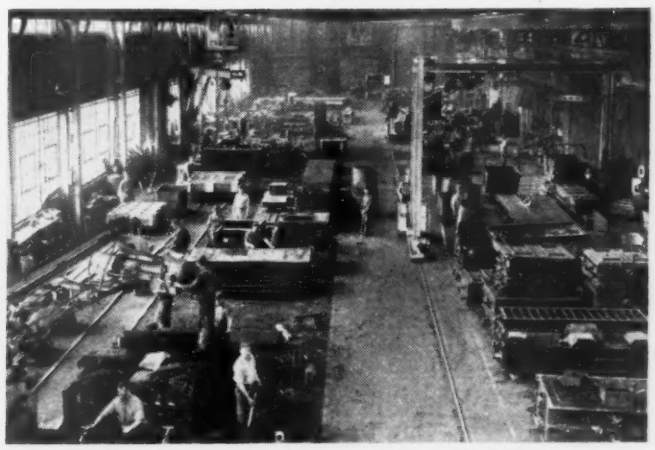

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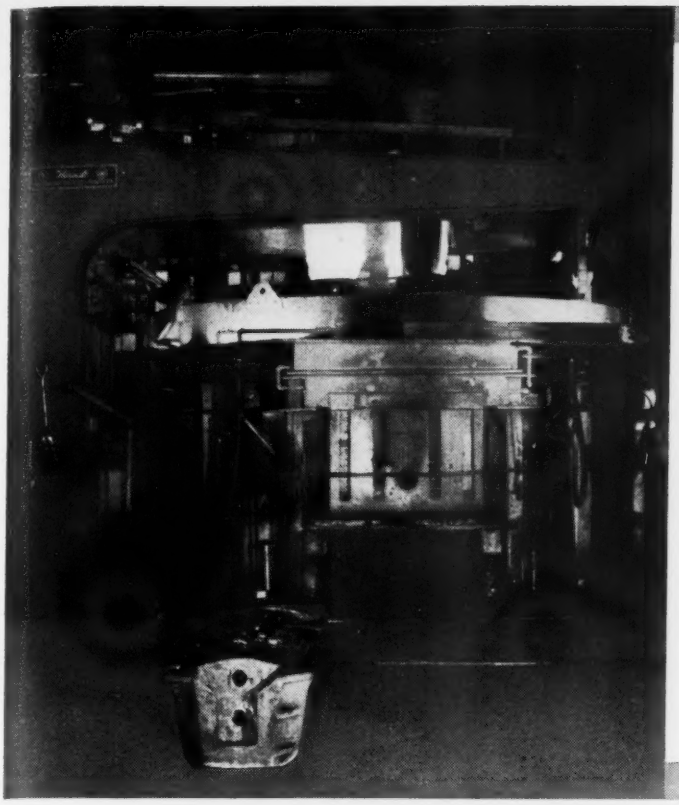

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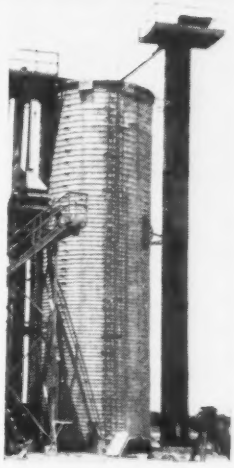

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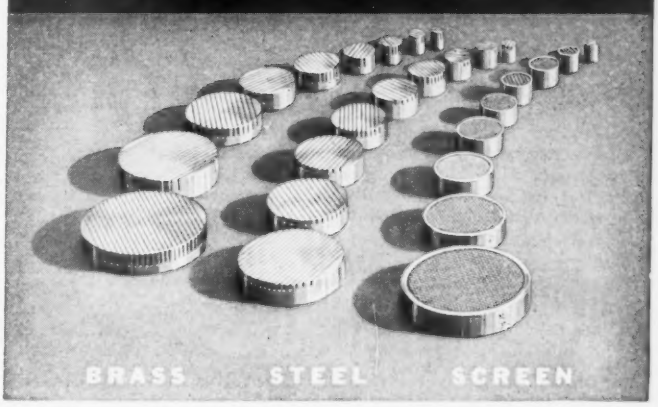

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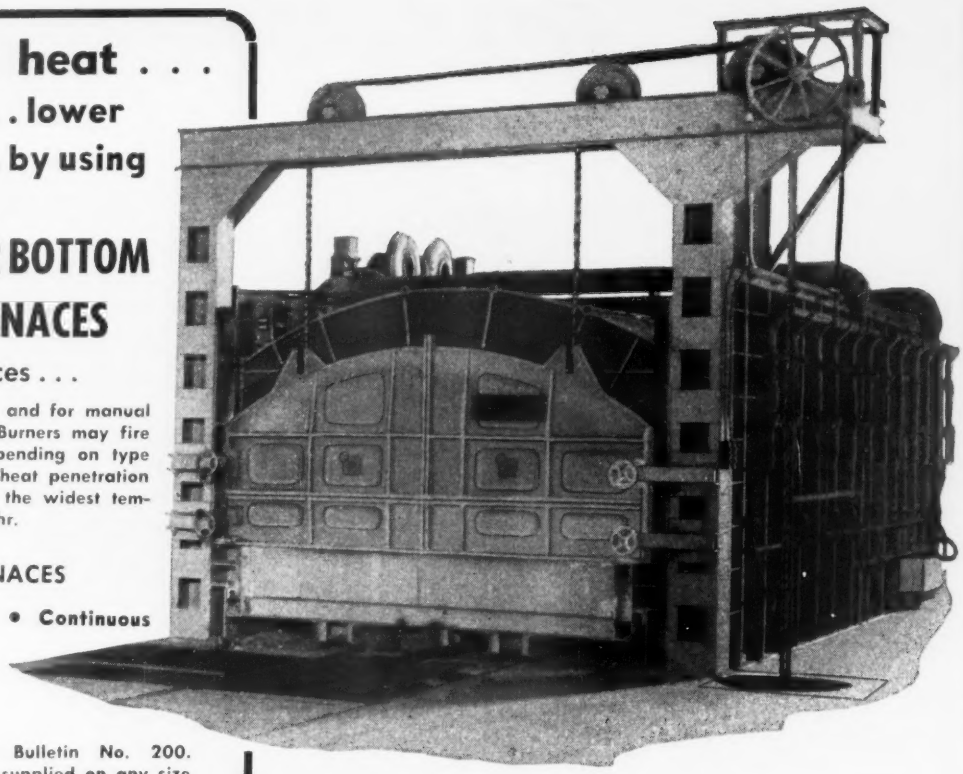

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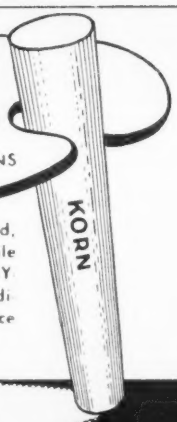

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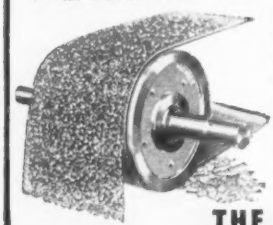

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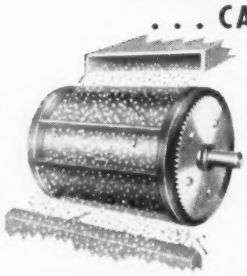

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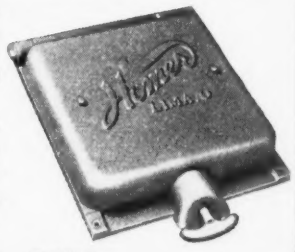
Homer MAGNETIC PLATES — Available in standard widths from 4" to 26"; lengths and number of poles as required. Special fabrications to your specifications.

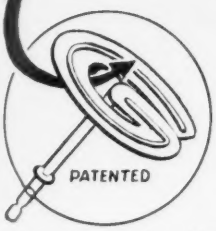


Write for descriptive bulletins

THE HOMER MANUFACTURING CO., INC., DEPT. 156, LIMA, OHIO

The Outstanding SHOULDER RADIATOR CHAPLET

OPEN HEAD HAS THIS ADVANTAGE



The Open Head enables you to pack sand solidly under the head and around stem of chaplet—and obtain more rigid and dependable core support.

It is a real contribution to minimum casting rejects.

We also make MOTOR CHAPLETS, Boiler Chaplets, Forged Head Chaplets, Fitted Head Chaplets, Double Head Chaplets and other types. *Write for Bulletin.*

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CLEVELAND Chaplets
Since 1890

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THE MONK TOOL CO.
UNION ST., GENEVA, ILL.

PRODUCERS CORE SAND CORPORATION
PITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN
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EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
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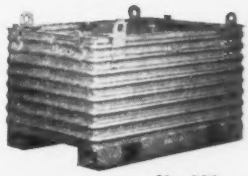
A COMPLETE FOUNDRY SERVICE

ENGINEERS

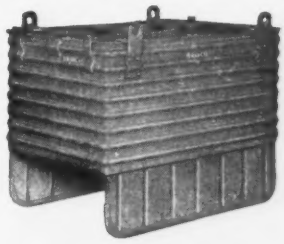
Here's why rugged BRUSCO handling equipment increases efficiency

BRUSCO CORRUGATED STEEL BOXES


No. 558

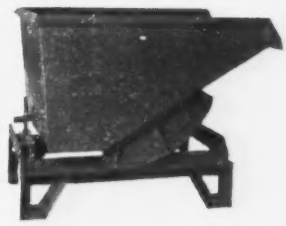
Save floor space — stack safely from floor to roof. Four way entry for fast, efficient handling. Equipped with crane lugs for movement by crane. Fabricated from heavy gauge corrugated steel to give added rigidity and maximum strength. Thoroughly and securely arc welded for longer, maintenance free life. Made in various sizes and load capacities to suit your requirements.

No. 559 BRUSCO CORRUGATED SKID BOX



Saves valuable floor space and speeds production. Made in all sizes and various gauges of steel to fit any load capacity. Stack from floor to roof.

No. 1210 BRUSCO SELF DUMPING HOPPER



Speeds production and saves labor in handling your parts and materials. This hopper is fabricated of heavy steel plate thoroughly reinforced. Made in ½, 1, 1½ and 2 cubic yard capacities. Underclearance is optional.

Write today for new Bulletin No. 500 presenting the most complete line of Part Boxes and Brusco Self Dumping Hoppers on the market.

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HANDLING EQUIPMENT
BRUMMELER STEEL PRODUCTS CORPORATION
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Added Dollars
POUR IN
WITH THESE 3
PROFIT MAKERS

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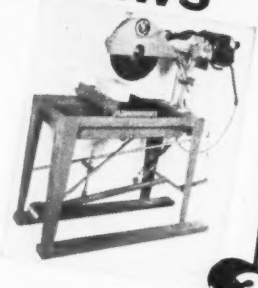
Advanced design for exact charging, discharging — adjustable triple mixing hoes — removable abrasion resistant alloy steel drum liners.

2 MASONRY SAWS

Precision cutting smoothly and safely. Unitized arm construction provides perfect alignment — reduces blade breakage (even under severe strains.)



3 JETLINERS

For patching cupolas pneumatically. Places high density—low moisture lining faster at lowest cost and with less attending care. Available with gas or electric power.

CONSTRUCTION MACHINERY COMPANIES
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SPECIAL
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Compiled by Ed Bremer, FOUNDRY Metallurgical Editor
This extensive glossary of foundry terms was compiled from a wide variety of sources. Arranged in handy booklet form, it is a valuable reference for every foundryman. *32 pages.*
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Williams Type

NO BUCKET-OPENING SHOCK ON CRANE HOOKS

The Wellman "Hook-on" single-line bucket provides you with clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Both bucket and crane are protected against opening shock by a pair of adjustable snubbing sheaves. The snubbing action on the closing lines eliminates any shock when the bucket opens—an important feature since the operator cannot control opening speed of a single-line bucket.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

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Reduced from 12 HOURS to 15 MINUTES with BURDETT *(The Original)* "RADIANT HEAT" GAS MOLD DRYER

Only short of a miracle—yet, here is the photographic proof showing the portable Burdett "Radiant Heat" unit that dries large sand molds to a depth of ½" in 15 minutes. Burdett results commonly increase production 300%, saving 25% to 40% in fuel. Ask for complete details.

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Also Manufacturers of "Radiant Heat" Systems, Ovens, Heaters, Air Make-Up Units, Spray Booths and Washers.

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• *In Use Or In Storage*

Hardlac pattern coating in standard pattern colors recommended by A.F.A. is ready to use and easy to apply. It sets up a smooth surface that resists core-oil absorption and sand abrasion. Protects patterns from swelling, shrinking and cracking. Ideal for metal patterns, also. *Write for Literature.*

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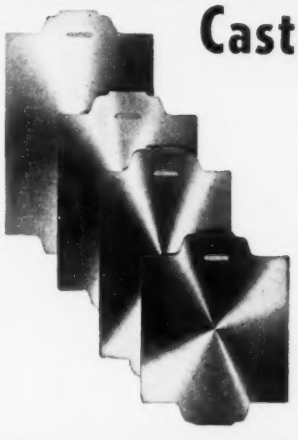

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Shipped promptly from the World's Largest Stock

All standard flask sizes are carried in stock. All plates are cast with one inch flask margin all around PLUS large, well shaped ears for flask pins and vibrator. Order by flask size, not plate size. It will pay you to investigate this source for quality plates

Some Typical Prices for ⅜" Plates . . . Add 33 1/3% For ½"

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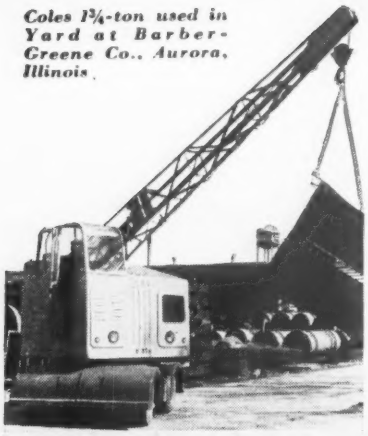
Send for Price List Today—Special Shapes and Thicknesses to Order

ARTHUR E. WILL, 643 West 11th Street, **ERIE, PA.**

Coles 1¾-ton used in Yard at Barber-Greene Co., Aurora, Illinois.



"All in all I have found it to be the

Most Versatile Piece of Equipment

for our rather cramped applications"

Attests: James B. Igleheart, Mgr. Warehouse Div., International Steel Company, Evansville, Ind.

THE ONLY CRANE THIS SIZE WITH FULL CIRCLE SWING!

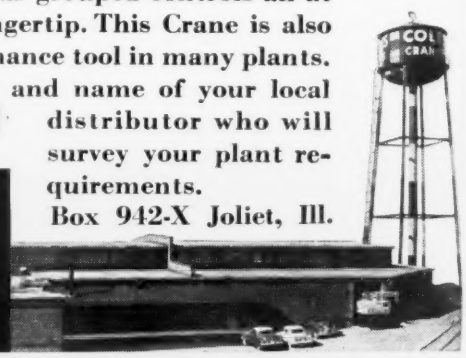
These 1¾-ton COLES CRANES are being used extensively for material handling, where ability to reach over the back of large piles... *is important*. With COLES you have exceptional maneuverability in close quarters, in or outdoors.

LITTLE CRANE DOING A BIG JOB

Yes—there's Giant Strength and a gentle touch in every COLES CRANE from 1¾ to 23 tons. Precision built to operate with smoothness and accuracy from four grouped controls all at the operator's fingertip. This Crane is also used as a maintenance tool in many plants. Write for details and name of your local distributor who will survey your plant requirements.

Box 942-X Joliet, Ill.

Inside warehouse International Steel Co. Evansville, Indiana



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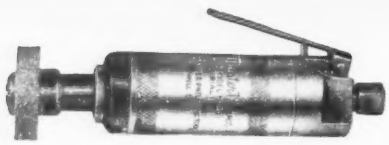
Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS



DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

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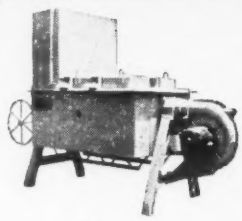
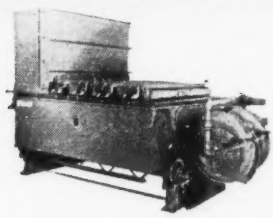


400 Series



1000 Series

Reda Stack-Loading melting furnaces for ferrous and non-ferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer, uninterrupted melting runs, and lower melting costs.

Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly.

Write or phone for complete details.

	CHARGE		MELT CAP./HR.	
SERIES	IRON	BRONZE	IRON	BRONZE
400	400#	450#	800#	1350#
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LARGER MODELS ON REQUEST

STACK LOADING

DIRECT FIRED—REFLECTING TYPE

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For low cost cleaning

- AMASTEEL is the blast cleaning material that is engineered for the job.
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Abrasive for any and all kinds of work.

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WELDED AND BOLTED TYPES • ALL SIZES • COMPLETE CONTROL EQUIPMENT • 26 YEARS A LEADER IN MAGNETIC MATERIALS HANDLING.

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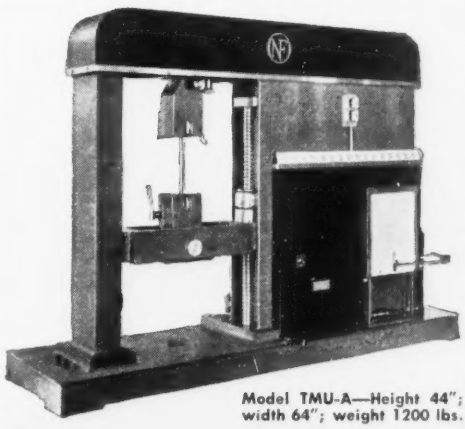

Model TMU-A—Height 44"; width 64"; weight 1200 lbs.

Make Your Own Tests in Your Plant Save Time and Test Costs . . .
NATIONAL FORGE Universal Testing Units

Simple to operate—no special training required, these sturdy universal testing machines are dependable and moderately priced.

Wide working clearances, long stroke, quick-action simplified variable speed control, improved grips and a wide spread of load scale ranges adapt this modern, streamlined unit to production, research or school instruction tests of a great variety of materials and specimen sizes. A.S.T.M. accuracy requirements are guaranteed.

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Testing Machine Division

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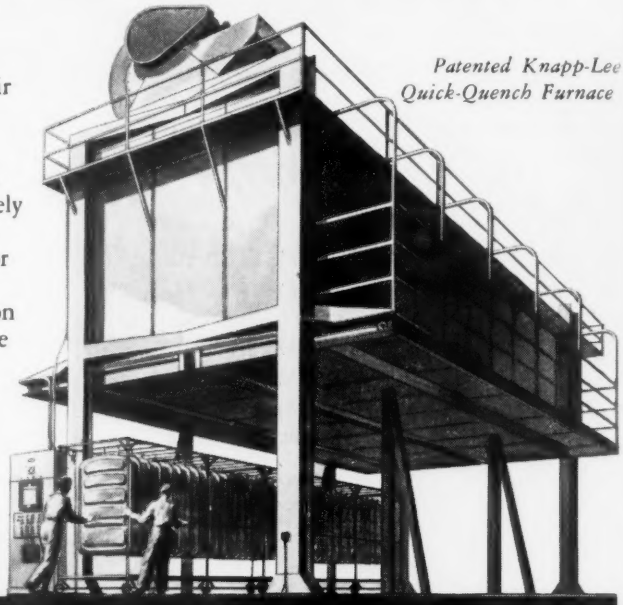
TOUGH PRODUCTION PROBLEMS

MADE EASIER WITH KNAPP'S 30 YEARS KNOW-HOW!

Manufacturers who have tough production schedules equip their plants with Knapp heat-treating equipment.

They are using them because they are built for SPEED:—Temperature recovery well within established limits. Quench adjustable from 3 to 8 seconds with arrested descent immediately before immersion, thus reducing impact and preventing excessive distortion; EASE OF HANDLING:—assured by floor level loading and unloading; SAFETY:—positive locking devices at floor level and top positions, all operations push button controlled by one operator; ACCURACY:—guaranteed variance of temperature not to exceed plus or minus 5°F in any part of the working zone after stabilization; QUALITY:—uniformly high physical and chemical properties due to the elimination of the human element.

Over 40 Airframe and other Manufacturers in the U.S. and abroad are meeting their production schedules with patented Knapp-Lee Quick-Quench furnaces.



Patented Knapp-Lee Quick-Quench Furnace

The Knapp reputation for building better equipment is maintained throughout its entire line of standard and custom built furnaces. Knapp has the answer to your heat treating problems. Write today.

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INDUSTRIAL FURNACES THAT SATISFY
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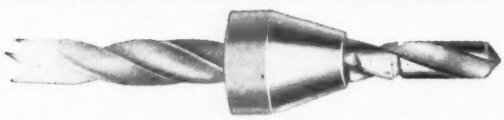
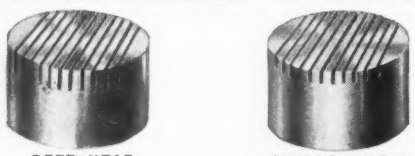
SERVING YOU
in
"Core Blowing Operations"
INSERTING DRILL



• Uniformity of holes • Faster insertion of vent • Correct Depth
CORE BOX VENTS



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VENT CLEANER

For Cleaning Slots
Made of Tempered Steel, Easy to Use

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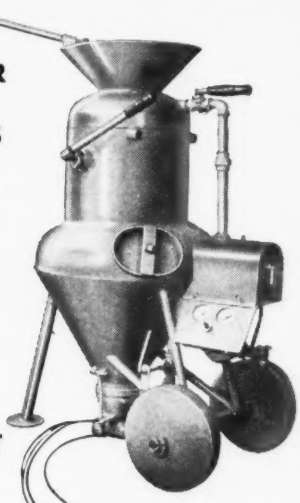
SHOOT YOUR MATERIALS IN PLACE
WITH THE
BLASTCRETE Machine



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UNRESTRICTED AS TO BRAND OR TYPE OF LINING MATERIALS

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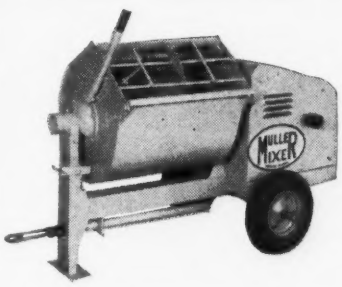
MAKE BETTER CORES FASTER



at less cost—
with
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MULLER Core Sand MIXER

3 cubic foot capacity—mixes 250-300 lbs. per batch. Every foundryman knows that better cores mean better castings. This new, labor-saving core sand mixer will pay for itself in a short time. Without it, your core room costs are higher than they should be.

PRICE: $344 complete with 1½ H. P. electric motor ready to plug in, FOB Metuchen, N. J.

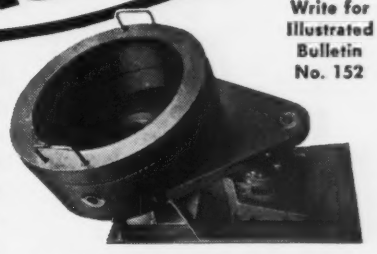
This mixer is available in a 6 cubic foot size, also.

MULLER MIXER

MULLER MACHINERY COMPANY, Inc.
Metuchen 14, N. J. Cable Address: MULMIX

Ideal for EXPERIMENTAL CENTRIFUGAL CASTING

Write for Illustrated Bulletin No. 152



MODEL J is well suited for experimental work in Aluminum, Iron, Steel and Bronze as well as regular production. Casts bearings, bushings, gears, etc. Accommodates interchangeably both permanent molds or sand molds up to 24" in diameter and up to 12" high.

MODEL J is versatile, sturdy and easy to operate to produce economically a wide range of superior castings. It is completely integrated on a single base, readily moved as a unit, and does not require a special foundation.

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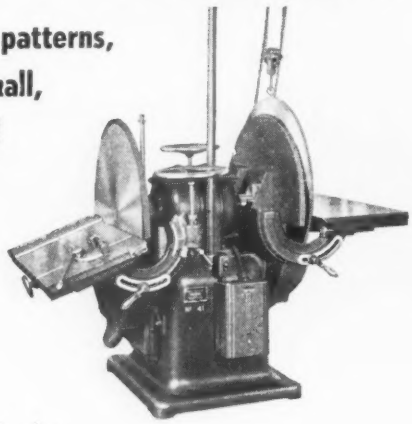
Tulsa 1, Okla.

"OLIVER" 37½-INCH DOUBLE-DISK SANDER

Sands wood patterns, large and small, nails and all!



This "Oliver" Sander smooths end grain and removes saw marks. Sands down screws and nails left in salvaged patterns. Sander comes with two disks 37½" diameter. Equipped with motor-in-head or belt drive. Tables have 2" lateral adjustment, and up to 45° angular adjustment. *Write for Bulletin 41D.*

OLIVER MACHINERY COMPANY

Established 1890 GRAND RAPIDS 2, MICH.

Impregnate PRESSURE CASTINGS Economically

A positive, low-cost method of impregnating pressure castings to meet the most rigid specifications. Pressure castings impregnated with this equipment have been successfully subjected to severe tests with hot kerosene, hot oil, hot water and other solutions under pressure, with no evidence of porosity remaining.

Meets All Contract Specifications

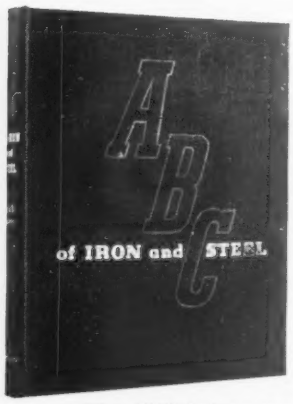
If your contract calls for casting impregnation, get the facts on this MOGULLIZER packaged plant which utilizes both pressure and vacuum stages.

Write today for free literature and recommendations for your casting salvage problems.

NOTE: There are job shops in certain areas who can take care of your contract work. A few territories are still open for job shop installation. Write for set-up plan today.

METALLIZING CO. OF AMERICA

Dept. F, 3520 W. Carroll Ave., Chicago 24, Ill., Telephone: SAcramento 2-3710



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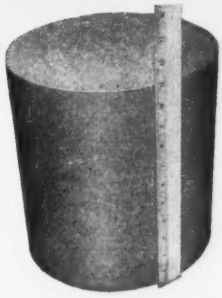

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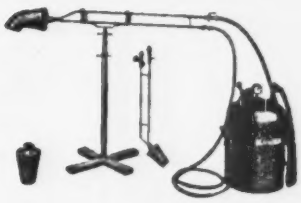

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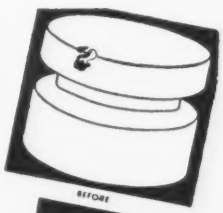

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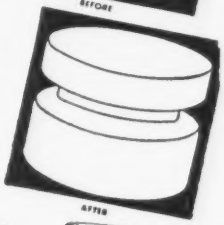

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FOUNDRY FOREMAN

Mechanized foundry in Northern Ohio. Fine opportunity for person fully qualified and having good knowledge of medium weight gray iron and semi-steel castings as to production, rigging and scrap control. Knowledge of cupola operations not essential. All replies confidential.

BOX 220

FOUNDRY CLEVELAND 13, OHIO

MAINTENANCE AND PLANT ENGINEER

Young engineer—M.E. or E.E. to specialize in plant engineering and preventive maintenance. Mechanized foundry in Northern Ohio. Send complete information, resume, experience and references. All replies considered confidential.

BOX 221

FOUNDRY CLEVELAND 13, OHIO

FOUNDRY PLANT ENGINEER AND MASTER MECHANIC

Who specializes in preventive maintenance for production in modern grey iron foundry, one of largest in California. Must be thoroughly experienced in all phases of core room, molding, cleaning of production foundry, etc. Salary open. Enclose resume of past experience and letters of recommendation together with photograph. Replies will be held in strictest confidence. All letters will be answered. Expenses paid for interviews.

BOX 174

FOUNDRY CLEVELAND 13, OHIO

STEEL FOUNDRY MEN

Experienced supervisors in pattern, foundry, core, cleaning, inspection, open hearth and process control required for large government owned defense plant in Chicago area currently engaged in production of armor castings. All levels of supervisors required. Company organizational setup of sufficient size and aggressiveness to afford permanent opportunity to supervisors whose performance proves above average. Address: Box 999, FOUNDRY, Cleveland 13,

FOUNDRY ENGINEERS AND DRAFTSMEN

Having foundry operating or plant engineering experience. Write, enclosing photograph and complete record of education and experience in detail, including previous employers and length of service. State age and salary expected. ADDRESS: LESTER B. KNIGHT & ASSOCIATES, INC., 600 W. JACKSON BLVD., CHICAGO 6, ILL.

INSPECTOR

For iron and steel castings in California foundry. State age, experience and salary expected. Address: Box 227, FOUNDRY, Cleveland 13, Ohio.

WELDING ENGINEER

Experienced welding engineer needed for plant in Chicago area currently engaged in production of armor castings. Man with technical and practical experience in welding steel castings particularly low alloy castings. Will have opportunity to grow in large steel casting organization. Address: Box 135, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN NONFERROUS FOUNDRY

With molding experience in making nonferrous castings required; practical experience and ability to handle men is essential. Company in Metropolitan New York area is expanding and there is an excellent opportunity for the right man. In making application state age, where you have worked and what you can do. Address: Box 177, FOUNDRY, Cleveland 13, Ohio.

EQUIPMENT SALESMEN

Leading manufacturer has several established territories to offer. This company's new policy means an attractive opportunity to future salesmen. Reply stating age, marital status and willingness to travel. Address: Box 180, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thoroughly experienced man in aluminum permanent mold for modern midwest foundry. Magnesium experience helpful. Essentials are ability to handle people and maintain production schedules. Technical background helpful, not required. For a qualified man who probably has at least ten years' experience, salary is open and future unlimited. Bonus plan. Send complete resume in confidence. Address: Box 122, FOUNDRY, Cleveland 13, Ohio.

CHIEF ENGINEER

SALARY $8000—$10,000

Permanent mold and die cast die design experience in light metals required. Man we want has a sound record behind him and has top management ambitions for the future. Bonus plan. Write in detail. Address: Box 121, FOUNDRY Cleveland 13, Ohio.

Help Wanted

GENERAL FOUNDRY FOREMAN

Large steel foundry in Eastern Pennsylvania has position available for aggressive steel foundryman. Excellent opportunity for advancement. Must have well-rounded foundry experience and be capable of coordinating core room, slinger floors, and dry floor, large casting production, for efficient operation. In reply state age, experience, salary expected and when available. Address: Box 188, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Gray iron foundry with capacity 40 to 50 tons daily, located Lower Michigan. Produces light and heavy castings on jobbing floors, squeezers and rockovers. Capable, aggressive man can have a very exceptional opportunity with many years successful operation. Age 45 or under.

BOX 224

FOUNDRY CLEVELAND 13, OHIO

CLEANING ROOM FOREMAN

To supervise cleaning, shipping and inspecting in modern, mechanized, gray iron foundry located near Los Angeles. Department employs approximately 25. Salary open for highly experienced man. Address: GREGG IRON FOUNDRY, 650 HICKSON STREET, EL MONTE, CALIF.

FOUNDRY METALLURGIST

Wanted for supervisory position by aluminum and bronze foundry in Northern Ohio. AAA-1 Co. Address: Box 182, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Opportunity for well qualified experienced superintendent of nonferrous foundry employing from 100 to 150 people. Applicant should be between 35 and 45 years of age. Enclose photograph and state complete record of education and experience in detail including previous employment and length of service. Address: Box 207, FOUNDRY, Cleveland 13, Ohio.

ABRASIVE SPECIALIST

As consulting engineer with wide experience in production of steel grit and shot is needed to place existing plant on modern, efficient operating basis. Profitable opportunity. Address: Box 218, FOUNDRY, Cleveland 13, Ohio.

WORKING MOLDING FOREMEN

Gray iron jobbing foundry 50 miles west of Chicago producing loose pattern work up to 5 tons needs one foreman for floor work (sandslinger) and one foreman for bench and squeezer work. Address: Box 217, FOUNDRY, Cleveland 13, Ohio.

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Long established company requires sales representative for Southern New England and Eastern New York territory. Give complete background in reply. Salary and commission. Address: Box 216, FOUNDRY, Cleveland 13, Ohio.

MOLD LINE FOREMAN

Experienced in malleable iron. Fine opportunity for qualified man. Large malleable foundry Central Ohio. Address: Box 205, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Southern Michigan grey iron jobbing foundry with yearly volume of over $400,000 has immediate opening for general manager to take complete charge of office, plant and sales. Permanent opportunity. When replying state age, family responsibilities, previous experience, etc. Address: Box 208, FOUNDRY, Cleveland 13, Ohio.

Representatives Wanted

REPRESENTATIVE WANTED

Pattern shop in N.W. Ohio. Open time on small or large wood production patterns and metal match plates. Address: Box 215, FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVE WANTED

Several territories are open for exclusive sales of AMERICAN Ceramic Strainer Cores and other ceramic products to the foundry industry. Very attractive offers made to those who can give this their full attention. Address: AMERICAN CLAY FORMING CO., AMERICAN FOUNDRY DIVISION, WILLISTON AND COMPANY, PEOPLES BANK BUILDING, DELTA, OHIO

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Accounts Wanted

SALES REPRESENTATIVE

Man with many years of experience serving metalworking field has decided to operate as a Manufacturers' Agent covering Northern Ohio for one or two well established lines. Interested in lines sold to metalworking including castings, forgings, gears, fasteners and sintered powdered metal parts. Address Box 191, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MANUFACTURERS' AGENT

Additional lines wanted, engineering background, well acquainted state of Wisconsin. Consider on exclusive basis only. Address: Box 204, FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE POSITION

Desired by young family man. Sound scholastical and practical background. Working knowledge of economics, production, sales and human relations. Experienced in molding, melting and sand and laboratory in both worker and supervisory capacity. Previously technical advisor in grey iron and malleable. Presently sales representative for large midwest foundry. Salary $10,000 year. Must give 30 days notice. Address: Box 226, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Metallurgical engineering graduate with twenty-nine years' steel foundry experience. Strong in administrative, labor relations, and technical phases of the business. Desires change, position with small or medium size steel foundry preferred. Address: Box 187, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 603, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Twenty-six years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 42, now employed. Address: Box 797, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Graduate—12 years of jobbing and production foundry experience, both light and heavy work in grey iron steel and malleable. Some nonferrous. Work has been mainly in rigging, trouble shooting, iron melting and plant engineering covering equipment planning, installation and maintenance. Presently employed but desires change—references. Any location considered. Address: Box 164, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PATTERN SUPERINTENDENT

FULLY EXPERIENCED IN HIGH PRODUCTION EQUIPMENT. OVER 30 YEARS' EXPERIENCE IN DESIGNING AND PRODUCING HIGH PRODUCTION EQUIPMENT. AGE 53. AVAILABLE SEPTEMBER 1st. ADDRESS: BOX 178, FOUNDRY, CLEVELAND 13, Ohio.

FOUNDRY SUPERINTENDENT

Fully qualified on large and small machine tool castings in gray iron. Good record on quality control, organizing ability, production and costs. Up to date on sand, metal and mechanization. Prefer foundry with over 200 men. Now employed. Address: Box 117, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

MANAGER—SUPERINTENDENT

Twenty-eight years of gray iron experience and some nonferrous. Outstanding practical and technical background. Have supervised as many as three hundred men, 125 tons daily, production and jobbing, mechanized or semi. Excellent cost man, ability to handle men and can obtain results. Age 47. Address: Box 991, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desires position as foreman or superintendent gray iron or nonferrous. Practical man, 26 years' experience in production and light jobbing shops. Address: Box 183, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Practical progressive foundryman—30 years' experience gray iron, semi-steel and malleable. Capable of taking complete charge all phases of any foundry—cost, sales, estimating, rigging for production and reduce scrap. Very cost minded. Last 15 years in executive capacity. Address: Box 195, FOUNDRY, Cleveland 13, Ohio.

FOREMAN—WOOD PATTERNMAKING

Twenty-two years as foreman and department manager in wood patternmaking including also ten years purchasing patterns and castings, expediting and coordinating. Experience on general machine patterns, power presses, rolling mill equipment, etc. Best of references from wherever pattern equipment was used. Address: Box 209, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Large or small castings in gray iron or nonferrous, green or dry sand. 20 years' practical experience in all foundry details. New Jersey preferred. Address: Box 214, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Man with 30 years' experience in foundry business would like core room foreman position in or around Boston, Mass. Address: Box 212, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

Wide experience, practical, technical and supervisory. Nonferrous operations. Desires position with good opportunity. Age 44, free to move if necessary. Address: Box 211, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

A graduate metallurgist with experience in steel, gray iron and brass. Forty years of age. Have had managerial experience and am desirous of becoming associated with progressive firm. Address: Box 176, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR EXECUTIVE ASSISTANT

Experienced as works manager, production superintendent and sales engineer of foundry producing heat resistant and stainless castings; also as chief metallurgist of tractor works. Desires position with progressive organization. Address: Box 223, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY METALLURGIST

Graduate, age 32, married, two children, with management experience desires position as assistant superintendent or supervisor in foundry in midwest. Broad technical background for field service if necessary. Can handle personnel, sand control, melting problems, methods, radiography, costs, safety, gating and risering, military specifications and would like to develop incentive system. Being released from Navy in October, available for interview now. Address: Box 229, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 222, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

First class patternmaker on wood, metal and plaster work. Capable of being foreman of small shop or can work on bench on any time of work. Know plaster pressure match plate and cope drag work with core boxes and driers. Forty years' experience in pattern and foundry trouble work. Address: Box 228, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGEMENT

Twelve years' practical experience in all phases steel foundry operations including manganese, armor, heat and corrosion resistant castings. Complete charge of all plant operations last six years. Graduate metallurgist. Age 36. Address: Box 225, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Fifteen years' experience as foundry superintendent. Light to heavy gray iron jobbing work. Practical and technical training. Cost minded and aggressive. Age 43. Address: Box 232, FOUNDRY, Cleveland 13, Ohio.

Opportunity

OPPORTUNITIES

Expanding Illinois Aluminum foundry offers excellent opportunity for active participation in ownership to permanent mold designer with excellent qualifications and experience and a desire to build on a worthwhile enterprise.

BOX 190
FOUNDRY CLEVELAND 13, OHIO

Available Capacity

OPEN CAPACITY

Electric steel castings, also ingots. New plant ready for operation, capacity 500 tons monthly. Address: ROY E. DUNCAN, FOUNDRY PRODUCTION SALES & SERVICE, 311 SCOTT AVENUE, NASHVILLE, TENNESSEE.

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Gray iron jobbing foundry has open capacity for production work. Quotations handled promptly. Address: Box 231, FOUNDRY, Cleveland 13, Ohio.

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WANTED

25 24" x 30" Steel Flasks with 5" Cope, 4" Drag.
1 Used SPO Jolt Stripper Cope Molding Machine.

Give Serial Number.

THE TREATY CO.

GREENVILLE, OHIO

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BRIDGE CRANES

ARNOLD HUGHES COMPANY

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Stationary, slow speed. 75 to 100 HP 220 V 3 PH 60 Cy or diesel powered. Address: ABC CORP., 34-12 10 ST., LONG ISLAND CITY 6, NEW YORK.

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Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED
USED EQUIPMENT

1—#4 Whiting cupola.
4—Model FA Modern pouring devices with 300 lb. ladles.
1—Covered geared ladle—1500# cap.
1—Roots positive pressure blower. Approx. 4000 CFM.
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Send complete information.

NEW CASTLE FOUNDRY CO.
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Art bronze foundry for sale outright or can be had one half down and balance can be arranged. A $250,000 outfit for $75,000 cash or on terms. Half century in this business and have customers since our beginning 1902. If interested in buying let's hear from you. Reason for selling, have had two heart attacks. Will teach the business to the buyer. Address: Box 219, FOUNDRY, Cleveland 13, Ohio.

WILL MERGE OR SELL ACTIVE ALUMINUM PERMANENT MOLD FOUNDRY

Available—Aluminum Permanent Mold Foundry with Tool and Die Shop, near Chicago. Established over six years in forty-five hundred square feet of favorably leased fire-resistant space, with reinforced concrete floors, city water and sewage. Adjacent to railroad siding and truck headquarters. Complete equipment in good working order. Gas fuel. Additional work force available. Comfortable backlog of orders for castings from number of large customers. Low overhead and break-even factors.
Might consider becoming captive to manufacturer who can use entire output or merger, thus freeing up present owner from whom prior responsibility demands more time. Open to ideas.
Cash consideration for Capital Stock would be $25,500, or for fixed assets, deferred charges, Good Will, etc. $29,000, plus value of inventory at time of sale.
For further details concerning this excellent opportunity address

BOX 166
FOUNDRY CLEVELAND 13, OHIO

MAGNESIUM FOUNDRY

Located small Oklahoma town. Excellent labor, no union. Building 60' x 130' with clean office. Concrete floor throughout. Excellent equipment. Immediate possession. Several good accounts presently being serviced including government work. Price $25,000. Will consider lease or profit sharing arrangement with experienced foundry manager. Address: Box 1424, Tulsa, Oklahoma.

NONFERROUS FOUNDRY

Very modern brass foundry California Bay district. Sales for 1951—$200,000. 4 molding stations, 3 crucible furnaces, tilting type, 800 lb. capacity, wheelabrator and automatic core oven. Roller conveyors to shakeout pits to controlled synthetic sand. Cost $60,000 to replace. Price $22,750 for quick sale. Concrete building adapted for foundry use. Will lease with option to buy.

BOX 206

FOUNDRY CLEVELAND 13, OHIO

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

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IRON FOUNDRY producing 20 tons small machinery castings per day. Excellent equipment for low cost production. Well trained personnel. This plant is priced low.
IRON FOUNDRY in rural area producing light and medium castings. Price $35,000, easy terms.

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In Western New York town, open shop, operating profitably, complete organization low costs. Equipped with squeezers for small castings, 100 tons monthly capacity. Ideal for company desiring captive foundry or will sell half interest to experienced foundryman. Present owner active in the business for over forty years. Address: Box 210, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE—GRAY IRON

Located Northeastern Ohio—in Dover. Personnel available for immediate operation. Building and equipment suitable for jobbing work. Address: SCHRADER FOUNDRY, Box 149, Dover, Ohio.

For Sale

LATE MODEL MOLDING MACHINES

#918 Johnston & Jennings Jolt Rollover and Pattern Draw—Table Size 44" x 54"	$1500.00
Herman Hi Speed Rollover & Pattern Draw Molding Machine—1500 lb. series; Table size 36" x 18"	$1500.00
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Also Vertical Tower Core Ovens, and Electric Melting Furnaces.

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1 COMPLETELY NEW REVERBERATORY FURNACE FOR MELTING ALUMINUM

Combination—oil or gas fired.
All steel construction.
Brick lining—4½" thick.
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Charged from door in rear or may be charged from side dip-out opening.
Spout tap discharge or dip-out discharge. Thermostatic controlled.
Temperature recording meter.
Leeds & Northrup Recording Instrument—Thermostat controlled 1000° to 1700° F.
Floor space: 8' x 8'.
Height: 8'.
Holding capacity: 2000 lbs.
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Includes all necessary controls and equipment for completing furnace other than brick for lining.
Detailed drawings furnished.
May be inspected.
Call us at our expense if interested.

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FOR SALE

MOLDING MACHINES
8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
1—International 14 x 8 jolt rollover draw.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
BLOWERS FOR CUPOLAS AND FURNACES
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
1—Connorsville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.
METAL MELTING EQUIPMENT
5—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—Pangborn Sand Blast Unit, including generator tank, shot cleaner, bucket elevator. Suitable for use with room.
MISCELLANEOUS
1—Sullivan WG6 11 x 10 50 HP air compressor.
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—NB-2 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
1—36W wet type Roto-clone 3400 CFM.
1—W wet type Roto-clone 13000 CFM.
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60.
4—Heavy Duty Flexible Shaft Grinders 2 HP.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

2—HERMAN Rollover & Draw Molding Machines, 40" x 60.
2—DAVENPORT Jolt Strippers #34AJS, 30" x 48"
2—JOHNSTON & JENNINGS Rollovers, 30" x 48"
24—Portable & stationary Jolt Squeezers.
2—Annealing Furnaces.
5—Large Core Ovens—1—Rack Type.
1—American Wheelabrator, 48 x 72", Skip Loader, etc.
1—Beardsley & Piper Mobile Sand Slinger, junior tractor type.
1—Rotary Fired Sand Dryer, 25' x 4", oil fired.
1—Speed Muller #60-41, Skip Hoist and Sand Cooler.
6—Model "S" Screenerators.
15—Crane Worm Geared Ladles: 1 to 7½ Tons cap.
5—Heavy duty Floor Grinders, 20 HP.
250—Tons Steel Flasks, all sizes.
Roller Conveyor, all sizes.
Send for Listing.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD STREET
SHILLINGTON, PA.
PHONES—READING 4-0146—3-0311
R. B. HARRISON, MGR. FDRY. DIV.

FOR SALE

36" x 46" AMERICAN WHEELABRATOR TUMBLAST CLEANING MACHINE.
SALE PRICE INCLUDES SPARE PARTS. MACHINE WAS BOUGHT IN FEBRUARY, 1949 AND IS IN GOOD CONDITION.
FOR FURTHER INFORMATION WRITE OR CALL

SLEEVE CASTINGS PLANT
PERFECT CIRCLE CORP.
RICHMOND, INDIANA

FOR SALE

1—Used Beardsley & Piper sandslinger. Practically new condition. Details promptly upon request.

FRANK B. FOSTER, INC.
2220 OLIVER BUILDING
PITTSBURGH 22, PA.
CABLE ADDRESS: "FOSTER PITTSBURGH"

For Sale

EQUIPMENT FOR SALE

1 18" x 36" Hines Heavy Duty Pop-Off Flask with 6" Cope, 5" Drag, and 8 Aluminum Jackets. Have had 6 molds made in them. Same as new.
6 10" x 20" Hines Pop-Off Flasks with 6" Drag, 5" Cope, and Cast Iron Jackets. Never used.
Misc. Wood Flasks, Molding Machines, etc.

THE TREATY CO.
GREENVILLE, OHIO

FOR SALE

Used steel core paltes—good condition
705 — 12" x 12"
384 — 12" x 14"
335 — 12" x 16"
166 — 12" x 18"
339 — 12" x 21"
169 — 14" x 14"
34 — 18" x 18"
Plates are 3/16" and ¼" thick.

FARRELL-CHEEK STEEL COMPANY
SANDUSKY, OHIO

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

FISHER MELTING FURNACE

With crucible 18" diameter, gas fired, hood and doors, capacity 2100 lbs. aluminum to 9,000 lbs. type metal, 200 CFM blower 220-440 V 60 C Wheelco Pyrometer, like new, used 30 days.

SMALL MOTORS INC.
2076 EILSTON AVE. CHICAGO 14, ILL.

FOR SALE

New 1952 unassembled Carl Mayer gas fired core baking oven. Complete with all accessories:
6' 0" wide
7' 0" deep
7' 0" high
500° F. Maximum
220 volt, 3 phase, 60 cycle controls
Available due to change in job requirement.

BOX 230
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Wheelabrator table #2 with 8-24" multitables complete suction fans, motors, dust tube collector—$3750.
Royers sand mixers—$175.
Sandblasting room 13' x 7' with McLoud 2000 lb generator gravity feed, walk in.—$650.00.

M. ELSTEIN
141 MANGIN STREET NEW YORK 2, N. Y.

SURPLUS EQUIPMENT AND SUPPLIES

1—36" x 66" I.D. Tumbling Barrel	$150.00
1—33" x 78" I.D. Tumbling Barrel	150.00
1—24" x 48" I.D. Tumbling Barrel	150.00
2—Johnson & Jennings 10" Jolt-Squeeze Molding Machines .....(EACH)	100.00
1—Gardner 4' Surface Grinder with 30 HP Motor	600.00
1—#15 Clirage Fan and Mounting	100.00
1—Whiting Ladle 400# barrel type ...	50.00
300—"Shanva" Mullite Cupola Blocks 42 x 54	
5—Ton Minco Bond	
2,000—Lbs Core Wire	

STILLMAN FOUNDRY
GRAND RAPIDS 4, MICH.

FOR SALE

Riehle Testing machine, 80,000# tensile and compression.
Oil filters, Sperry, 18" x 18", plate and frame, closed delivery, 11 chambers.
Simpson sand mixers, #0, #1, #1½, #2, #3.
Miscellaneous: Screens, grinders, pulverizers, all types conveyors, tyler rotap screen, etc.
LOW PRICE QUICK DELIVERY

CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

FOR SALE

30—Sets Flasks, 17" x 19" Cope and Drag, 22½" Pin Centers. Bars in Cope and Drag.
50—Sets Round Flasks, 15" Dia., 4" Cope and Drag, 18" Pin Centers. Bars in Drag.
100—Sets 18" Round Flasks, 4½" Cope with Bars, 5¾" Drag with Bars, 24¼" Pin Centers.
1—Baker-Perkins Mixer, 12 cu. ft.

CHESANING PIPE COMPANY
CHESANING, MICH.

For Sale

FOR SALE
SAND BLAST EQUIPMENT

Wheelabrators-Tumblast size 48 x 42 Hurry, 3 more have been released for immediate sale priced 4 to $5000.00.
Wheelabrator size 48 x 72 like new.
Wheelabrator size 48 x 48 good condition.
Wheelabrator 4 Ft. Table Blast w/tables $1750.00.
Wheelabrator 27 x 36 Tumblast good condition—rubber belt $3000.00.
Pangborn 1GF Air Tumble Bbl. 150# load cap.
Pangborn ES-207 Blast Cleaning Cabinet used for strip steel or bar stock $1750.00.
Pangborn 8 ft. table with 7 28" tables $4000.00.
Sand Blast room 10 x 10, reasonable.
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SALES INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

FOR SALE

2—Nicholls Jolt Squeeze Automatic Draw Molding Machines, never used since being completely rebuilt by one of General Motors largest foundries.
Size 14 x 30; Type "D"; Draw 2-4-6.
Two extra stripping frames and jolt tables.
Will make 90 molds per hour.
Price—$1,200.00 for lot.
1—Hausfeld 1200 pound magnesium tilting melting furnace, gas or oil, like new. Also 3—1200 pound crucibles, 1 slightly used and 2 never have had heat taken off. Furnace and crucibles $1,000.00 lot.
1—Lindberg aluminum or magnesium heat treat oven, type 487230 EH; Serial #3952; manufacture #1250; 75 KW, 230 volts, 3 phase. All new controls and instruments. Close temperature control.
For further information contact:

MR. J. T. COE
AMERICAN MAGNESIUM CASTING CO.
3866 ELIZABETH LAKE ROAD
PONTIAC, MICHIGAN

MACHINERY FOR SALE

2—Johnston & Jennings Jolt Pin Lift. Molding Machines, 30" x 36" table. 10" draw. ADDRESS GOLD FOUNDRY & MACHINE WORKS, 1618 SOUTH OSAGE ST., INDEPENDENCE, MO.

FLASKS

Sterling Wheelbarrow Rolled Steel
11 sets 46 x 50 6" cope, 6" drag
9 sets 36 x 44 6" cope, 6" drag
12 sets 32 x 48 6" cope, 8" drag
12 sets 32 x 48 6" cope, 8" drag
Condition: like new. Priced right.

JOLT-STRIP MACHINE, Herman mfg., 6000# series, 48 x 54 table, 12" draw. Late model, exc. cond. $2,500.00 f.o.b.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, O.

FOR SALE

Used Stroman Model R, 6,000 lbs. iron melting or duplexing furnace, gas fired. 400/3/60. Motors and controls for chain drive pouring and blowers. Recently used for copper base alloys. Excellent condition. Address: AMPCO METAL, INC., 1745 S. 38th ST., MILWAUKEE 46, WISCONSIN.

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4500	16 oz.	G.E.	675	16 oz.	Spencer
4000	32 oz.	Spencer	660	20 oz.	A-B
3500	40 oz.	Spencer	650	16 oz.	Spencer
2800	1 oz.	Spencer	500	10 oz.	No. Am.
2700	16 oz.	No. Am.	400	4.3 oz.	Spencer
2700	16 oz.	Spencer	400	16 oz.	Spencer
2500	7 oz.	Sturt.	340	20 oz.	A-B
2200	16 oz.	No. Am.	320	12 oz.	Spencer
2000	2½ oz.	Spencer	225	16 oz.	Spencer
2000	1 oz.	Spencer	180	15 oz.	Spencer
1150	20 oz.	No. Am.	9100	7" SP	Sturt.
800	8 oz.	No. Am.	1100	4½" SP	Bayley
			100	7" SP	Spencer

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

For Sale

FOR SALE

ROTOCLONE #36, wet type, 34,000 CFM 3 inch T.P. Complete, with GE 100 hp T.E.F.C. Motor.
DYNAMIC PRECIPITATOR #24 (Dust Collector), wet type, 13,084 CFM at 3.9 SP. Mfg. Am. Air Filter Co., type W. Complete with 50 hp Motor.
BLOWER, Low Pressure, Cent. type for Exhaust, Mfg. U. S. Air Cond., 36,000 CFM at ⅛" SP. Complete with 15 hp T.E.F.C. Motor. Above three units in excellent cond., can be purchased with or without motors.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, OHIO

FOR SALE

1—International type PK Jolt Squeeze Pin Lift 18" cylinder, 8" lift
1—International Plain Jolt—18" x 24" Table
1—Champion Core Roll-over, 16" x 8", Portable
1—1-ton Gear Ladle
1—3 HP Stand Grinder
1—2-ton Lo-Hed Hoist, 220 V., D.C.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE—STACK MOLDING MACHINE

1—International type JSK-7 jolt squeeze pin strip molding machine. Practically new and in excellent condition, used less than three months. Also, 60 aluminum stack flasks for same, size 13" x 26" x 3".

VESTAL STOVE COMPANY
SWEETWATER, TENNESSEE

ARE YOU LOOKING FOR STEEL FOR A NEW BUILDING?

We have available steel framework for a building 60' x 140' long and 21'6" to the bottom cord of truss. Columns are mounted with brackets for crane way. Send for additional information, if interested. This material can be purchased without priority. Address: BERGEN POINT BRASS FOUNDRY, INC., AVENUE A AT SIXTH ST., BAYONNE, NEW JERSEY.

EQUIPMENT FOR SALE

2—Osborn #601 jolt rollover pattern draw machines.
1—Milwaukee #60-B jolt rollover pattern draw machine.
1—American wheelabrator tumblast 27 x 36 without skip hoist.
1—American wheelabrator tumblast 36 x 42 with skip hoist.
1—American A M sandcutter.
1—American A.A. sandcutter gasoline driven.
2—U. S. Johnson & Jennings #2 jolt squeeze pinlift machines.
2—Tabor portable jolt squeeze pin lift machines.
All the above equipment is in good condition and prices to sell.

MARCH BROWNBACK CO. INC.
POTTSTOWN, PA.

FOR SALE

1—Motive Speedslinger (Beardsley & Piper) Ramming capacity 2000# per minute; 2—20 ton portable tanks; 14'0" first arm; 17'6" ramming unit; 22" head, 5" tip; 4'8½" track gauge; complete with motors, controls, etc.
Used less than 1 year, good condition.

U. S. PIPE AND FOUNDRY COMPANY
PURCHASING DEPT.
BURLINGTON, N. J.

FOR SALE

1—Type FS347 Ingersoll Rand centrifugal motor blower rated at 4400 CFM at 1.25 pounds pressure with General Electric air weight control—40 HP motor, 220-440 V—60 cycle. Perfect condition $2,000.00 f.o.b. St. Louis, Missouri. Address: CARONDELET FOUNDRY COMPANY, ST. LOUIS 10, MISSOURI.

FOR SALE

Shell molding equipment: 220 V single phase electric heating and curing furnace with Dillon thermometer and rollover machine—both for shells up to 10 x 20. Ideal for getting started. $200. Address Box 213, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

1—Clark Model 2015, 2000 lb. Gas Fork Lift Truck, 1948, rebuilt Jan. 1950.

1-"Truckman" gas warehouse towing tractor pulls 3000 lb. loads.

2—5000 lb. cap. Magcoa dock boards, weight 150 lbs. ea. 1 64"w x 60"l. 1 59"w x 60"l.

6—2000 lb. cap. Magcoa dock boards, weight 40 lbs. ea., 42"w x 36"l.

LUTHE HARDWARE
1450 EAST AURORA AVE.
DES MOINES 5, IOWA

EQUIPMENT FOR SALE

1—750# Electric Hoist	$275.00
1—Redford Core Blower & Accessories	175.00
1—#1902—2' Flask Rapper	60.00
1—10" Plain Squeezer	100.00
1—1 Ton Runway and paving device with ladle	900.00
1—1 Ton Lo-Hed Hoist & Runway	1250.00
2—29" dia. x 29" deep truck ladles	150.00 ea.
1—#A-1 Blystone 3 Cubic Foot Mixer	195.00
1—#7 Whiting Foundry Cupola	1800.00
1—1 Ton Whiting Cupola Charger	1850.00
1—26" Standard Geared Crane Ladle	100.00
1—Roller Bearing Truck for Crane Ladle	50.00
1—Trolley, Track, etc., for Foundry Crane	1000.00
1—½ Ton, 4 Wheel Trolley Hoist	275.00
1—Spencer Turba Compressor	500.00
1—#400-12 Moulders Bench	35.00
1—½ Ton, 4 Wheel Hoist	275.00
1—Federal Core Jarring Machine	75.00
1—10" Plain Jar Squeezer	100.00
4—5 Ton Sand Hoppers with Bucket Loader and Belt Conveyor Unloaders	500.00 ea.
1—Osborn Moulding Machine	50.00
1—Beardsley & Piper Sand Separator	100.00
1—4 Ton Geared Ladle	225.00
2—Tabor Column Jar Squeeze Machines	100.00 ea.
1—6 Ton Ladle Numerous Handles 40# to 300# capacity	
1—42x78 Herman 6000# Jolt Rollover Molding Machine No. 379	1500.00
1—24x42 Herman 750# Jolt Rollover Molding Machine No. 2040	1895.00
1—24x42 Herman 750# Jolt Rollover Molding Machine No. 1233	1257.00
1—30x48 Herman 1500# Jolt Rollover Molding Machine No. 1647	1775.00
1—1½ Ton Capacity Pouring Ladle.	
4—One Ton Buggy Ladles.	

Other miscellaneous foundry equipment.
All items subject to prior sale.
Prices F.O.B. York.

A. B. FARQUHAR COMPANY
YORK, PENNSYLVANIA
PHONE 7801

SANDCUTTER—FOR SALE

$775.00—six ft. excellent condition with extra new spare parts. Phone: 84725 or write: RAPIDS FOUNDRY & ENGINEERING INC. 832 Ottawa Ave., N.W., GRAND RAPIDS 2, MICHIGAN.

WANTED

Flask—Steel or Cast Iron
10' diameter
1 12" cope
2 10" drags
3 8" drags
2 Bottom plates
1" thick in steel
2" thick in cast iron

CROWN NONFERROUS FOUNDRY INC.
CONCORD AVE.
CHESTER, PA.

FOR SALE

1—J & J #612 Moulding Machine rollover jolt pattern draw 10" draw, 24" x 30" table.
1—J & J #815B Moulding Machine rollover jolt pattern draw 10" draw, 30" x 40" table. Price very attractive.

THE McNALLY PITTSBURGH MFG. CORP.
PITTSBURG, KANSAS

CLASSIFIED ADVERTISING

For Sale

SALE OR LEASE

Small mfg. plant nonferrous foundry and machine shop complete tooling etc. for Stearns Drum Faucets, saw sets, jointers, hand and air operated grease guns, numerous other hardware and automotive items. Sell or lease all or any part. Exceptional terms to right party. Reason ill health. Located central New York. Address: **G. M. POLHEMUS, MANLIUS, NEW YORK.**

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY BRINGS RESULTS!

IF YOU ARE SEEKING A CHANGE OF POSITION TO BETTER YOUR SITUATION AND ARE QUALIFIED FOR A BETTER JOB, TELL THE 45,000 READERS OF FOUNDRY ABOUT IT.

DON'T "HIDE YOUR LIGHT UNDER A BUSHEL"—THERE ARE TIMES WHEN A MAN SHOULD TALK ABOUT HIMSELF AND THERE ARE A LOT OF MEN QUALIFIED FOR BETTER POSITIONS WHO DO NOT KNOW HOW TO GO ABOUT IT OR WHERE TO SEEK HIGHER RESPONSIBILITIES.

YOUR CLASSIFIED ADVERTISEMENT IN FOUNDRY WILL BE WIDELY READ AND THE RESULTS MAY SURPRISE YOU!

IT COSTS BUT LITTLE. WHY NOT RUN AN ADVERTISEMENT ABOUT YOURSELF IN TWO OR THREE ISSUES?

WRITE

FOUNDRY

CLASSIFIED ADVERTISING DEPT.

PENTON BLDG., CLEVELAND 13, OHIO

FOR SALE

2—24″ x 24′ Belt Conveyors, 5 H.P. 220/440V. 3ph. 60cy.
1—#405-79 Osborn Rollover and Pattern Draw Molding Machine.
1—#405 Osborn Rollover and Pattern Draw Molding Machine.
1—Herman Rollover & Pattern Draw heavy duty 6000# series Molding Machine 40″ x 84″ table. A-1condition.
1—Herman Pitless type 4000# series Rollover & Pattern Draw Molding Machine, 32″ x 48″ table. A-1 condition.
1—International Type GS Jolt ram, Rollover & Pattern Draw Molding Machine, 28″ x 36″ table.
7—#601-13 Osborn Jolt Rollover & Pattern Draw Molding Machines.
6—#2047-4 Osborn Jolt Rollover & Pattern Draw Molding Machines for Cylinder head core production.
12—#2048 Osborn Rollover Molding Machines for core closing.
1—22″ x 32″ Tabor Jolt Rollover Molding Machine.
2—30″ x 40″ Tabor Jolt Rollover Molding Machines.
1—#147 Osborn Rockover & Draw Machine for long jobs.
2—#146 Osborn Rockover & Draw Machines.
4—#814-P Osborn Jolt Squeeze Strippers, 14″ squeeze cyl., 700# jolt cap.
3—#2166 Spo Jolt Squeeze Pin Lift Molding Machines.
1—Type JDP International, Jolt Ram, Power Pin Lift 1200# cap. 8″ draw.
1—Spo Rockover Draw Machine 12″ stroke, 38″ x 46″ table.
5—Champion Draw Power Pushoff Machines 10″ draw, 38″ x 40″ table.
2—Milwaukee Jolt Squeeze Molding Machines.
1—#1 Demmler Core Blower—New.
1—#3 Demmler Core Blower—A-1 cond.
10—#92 Osborn Core Blowers—A-1 cond.
1—Kane & Roach Wire Straightener, 31/16″ to ½″ wire, 7½ HP. 440 V.
1—3 H.P. double stand grinder, belt driven.
1—40 H.P. Pennsylvania Air Compressor.
2—3 H.P. Blowers for furnaces.
2—50 H.P. Spencer Turbine Cupola Blowers 220/440V. 3ph. 60cy. 16 oz.
1—20 H.P. North American Turbine Blower 220/440V. 3ph. 60cy. 24 oz.
1—American Wheelabrator 48″ x 42″, Model 450, A-1 cond.
4—International type JFL Jolt Ram, Foot lever lift Molding Machines 3″ lift. 600# cap.
3—Tumbling Mills 30″ x 60″.
1—Eclipse Salt Bath Furnace, M-225, gas fired.
2—500# Monarch Aluminum Hand Tilting Furnaces.
1—Osborn #42 Rockover & Draw Machine.
1—Revolving Core Conveyor Table (Bush-Lawrence) like new.
1—Fin Cleaning Machine (Ireland) for cleaning fins on castings.
1—Jones Worm Gear Reducer, Driving shaft 900 RPM, Ratio 8 to 1 Mounted on C.I. base with 15 H.P. Allis-Chalmers motor 3ph. 60cy. 440V. 1150 RPM.
Various sizes of steel flasks.
Various sizes of Hines Popoff Flasks and Jackets.
2—Micromax Instruments Leeds & Northrup Temperature Control.
2—Jeffrey Type 3 Vibrators for Shakeouts.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.
15019 Saranac Rd., Cleveland 10, Ohio Telephone—GLenville 1-1538

CLASSIFIED ADVERTISING RATES

POSITION WANTED — Minimum advertisement set solid, 30 words or less, $3.00. Additional words 10c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $6.00. Additional words 20c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

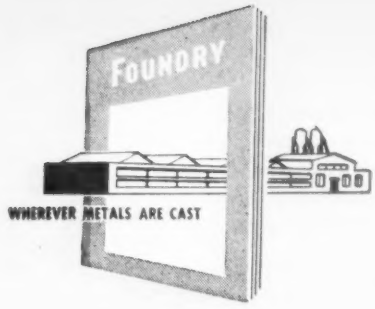
Single Column 2¼″ Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 18.00	$ 16.50	$ 15.00	$ 13.50
2 inches	32.50	30.00	27.50	25.00
3 inches	46.50	43.00	39.50	36.00
4 inches	60.00	55.50	51.00	46.50
5 inches	73.00	67.50	62.00	56.50
6 inches	85.50	79.00	72.50	66.00
7 inches	97.50	90.00	82.50	75.00
8 inches	109.00	100.50	92.00	83.50
9 inches	120.00	110.50	101.00	91.50
10 inches (1 col.)	130.50	120.00	109.50	99.00
Half page	195.00	180.00	165.00	150.00
Full page	330.00	300.00	270.00	240.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO



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Penton Building, Cleveland 13, Ohio
Main 1-8260

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Detroit, 2 ..... 6560 Cass Ave. Trinity 5-3024
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Pittsburgh, 19 ..... 2837 Koppers Building Atlantic 1-3211
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London ..... 2 Caxton St. Westminster, S.W. 1
Griffin, Ga. ..... 331 South 12th St.

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Also publisher of STEEL • MACHINE DESIGN
NEW EQUIPMENT DIGEST

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ADVERTISING

A

Accurate Match Plate Co. 127
Acheson Colloids Co. 29
Acme Foundry Co. 287
Adams Co., The 200
Air Reduction 58
Ajax Electric Co., Inc. 257
Ajax Electric Furnace Corp. 257
Ajax Electro Metallurgical Corp. 257
Ajax Electrothermic Corp. 257
Ajax Engineering Corp. 257
Ajax Flexible Coupling Co., Inc. 269
Allied Chemical & Dye Corp., The Barrett Div. 17
Allied Chemical & Dye Corp., Semet-Solvay Div. 284
Allis-Chalmers 39, 243
Alloy Metal Abrasive Co. 301
Alter Co. 293
American Air Filter Co., Inc. 14
American Bridge Div., U. S. Steel Co. 295
American Clay Forming Co. 260
American Gum Products Co. 303
American MonoRail Co., The 242
American Optical Co. 9
American Smelting & Refining Co. 305
American Smelting & Refining Co., Federated Metals Div. 42
American Wheelabrator & Equipment Corp. 18, 19, 125, 206
Anderson Pattern Inc. 280
Archer-Daniels-Midland Co., Foundry Products Div. 4, 5
Asbury Graphite Mills, Inc. 282

B

Babcock & Wilcox Co., The, Refractories Div. 54
Bailey, William M., Co. 188
Bakelite Co., A Div. of Union Carbide & Carbon Corp. 15
Baroid Sales Div., National Lead Co. 274
Barrett Div., The, Allied Chemical & Dye Corp. 17
Bartlett, C. O., & Snow Co., The ..... Back Cover
Bassichis Co., The 301
Bay State Abrasive Products Co. 152, 153
Bay State Crucible Co. 299
Beardsley & Piper Div. of Pettibone Mulliken Corp. 149, 150, 183, 184, 185, 186
Beck, P. C., Co. 245
Bedford Tool & Forge Co. 276
Bell, M. A. Co. 305
Beryllium Corp., The 193
Besly-Welles Corp. 53
Birmingham Committee of 100 270
Black, Sivalls & Bryson, Inc. 28
Blastcrete Equipment Co., Inc. 302
Boston Woven Hose & Rubber Co. 80
Bowser, Inc. 163
Brummeler Steel Products Corp. 297
Buffalo Pattern Works, Inc. 175
Burdett Mfg. Co. 299

C

Campbell-Hausfeld Co., The 214
Cannon Vibrator Co. 218
Carborundum Co., The 62, 63, 282
Carl-Mayer Corp., The 31
Carman, Edwin S., Inc., ... 297
Cast-Master, Inc. 287
Central Pattern Co. 276
Centrifugal Casting Machine Co. 303
Chicago Manufacturing & Distributing Co. 271
Chicago Pneumatic Tool Co. 255
Chicago Wheel & Manufacturing Co. 264
Chisholm-Moore Hoist Corp. 256
Christiansen Corp. 176
City Pattern Foundry & Machine Co. 209
Clark Equipment Co., Industrial Truck Div. 241
Clayton-Sherman Abrasives Co. 259
Clearfield Machine Co. 267
Cleco Div. of the Reed Roller Bit Co. 169
Cleveland Chaplet & Manufacturing Co. 297
Cleveland Crane & Engineering Co., The, Cleveland Tramrail Div. 221
Cleveland Flux Co., The 145
Cleveland Metal Abrasive Co., The 132
Cleveland Quarries Co., The 224
Cleveland Standard Pattern Works, Inc. 195
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 221
Cleveland Vibrator Co., The 281
Coles Cranes, Inc. 300
Columbia-Southern Chemical Corp. 290
Columbus McKinnon Chain Corp. 256
Combined Supply & Equipment Co., Inc. 291
Construction Machinery Co's 298
Corn Products Refining Co. 22
Crescent Brass & Pin Co. 228
Crobaugh, Frank L., Co., The 301
Crucible Manufacturers Association 11
Curtis Pneumatic Machinery Div. of Curtis Manufacturing Co. 21

D

Dayton Pneumatic Tool Co. 293
DeBardeleben Coal Corp. 296
Delta Oil Products Co. 55
Demmler, Wm., & Bros. 35, 295
Denver Equipment Co. 69
Detroit Electric Furnace Div., Kuhlman Electric Co. 60, 61
Diamond Iron Works, Inc., Mahr Mfg. Co. Div. 296
Dings Magnetic Separator Co. 43
DoAll Co., The 45
Dow Corning Corp. 239
Dravo Corp., Heating Department 73
Dresser Industries, Inc., Roots-Connersville Blower Corp. Div. 226
Durez Plastics & Chemicals, Inc. 157

E

Eastern Clay Products Dept., International Minerals & Chemical Corp. 225
Eastman Kodak Co., X-Ray Div. 163
Electric Furnace Co., The 278
Electro Metallurgical Co. A Div. of Union Carbide & Carbon Corp. 78
Electro Refractories & Abrasives Corp. 194

F

Fabreeka Products Co., Inc. 213
Factory Specialty Corp. 168
Fanner Manufacturing Co., The 227
Federal Foundry Supply Co., The 2, 36, 37
Federated Metals Div., American Smelting & Refining Co. 42
Foundry Equipment Co., The 16
Foundry Equipment & Supply Co. 284
Foundry Rubber, Inc. 220
Foundry Services, Inc. 264
Foundry Supplies Manufacturing Co. 283
Foxboro Co., The 237
Freeman Supply Co., The 231
Fremont Flask Co., The 52
Frontier Bronze Corp. 294

G

General Electric Co. 47
General Electric Co., X-Ray Dept. 72

INDEX

Giffels & Vallet, Inc. 197
Goodyear Tire & Rubber Co., The 20
Gordon, Claud S., Co. 234
Great Lakes Carbon Corp. 139
Great Westtrn Manufacturing Co. 210

H

Hauck Manufacturing Co. 305
Hercules Powder Co., Inc. 40
Herman Pneumatic Machine Co. 178, 179
Hewitt-Robins, Inc. 75
Hickman, Williams & Co., Inc. 30, 154
Hines Flask Co., The 76, 77
Holcroft & Co. 236
Homer Manufacturing Co., Inc., The 296
Hooker Electrochemical Co. 49
Hough, Frank G., Co., The 65
Hydro-Blast Corp. 159

I

Illinois Clay Products Co. 129
Illinois Testing Laboratories, Inc. 156
Imperial Belting Co. 10
Industrial Equipment Co. 24
Industrial Metal Abrasives Co. 177
International Minerals & Chemical Corp., Eastern Clay Products Dept. 225
International Molding Machine Co. 135
International Nickel Co., Inc., The 1
Iowa Mfg. Co. 217
Ironton Fire Brick Co., The 235

J

Jackson Iron & Steel Co., The 294
Jeffrey Manufacturing Co., The 79
Jobbins, William F., Inc. 219
Johns-Manville 180
Johnson-March 293
Johnston Mfg. Co. 286
Joy Manufacturing Co. 48

K

Kawin, Charles C., Co. 260
Keller Tool Co. 83
Keokuk Electro-Metals Co. 135
Kirk & Blum Manufacturing Co., The 275
Knapp, James H., Co., Inc. 302
Knight, Lester B., & Associates, Inc. 315
Korn, Wm., Inc. 296
Kuhlman Electric Co., Detroit Electric Furnace Div. 60, 61
Kwik-Mix Co. 208

L

Lanly Co., The 23
Lavin, R., & Sons, Inc. 74
Lindberg Engineering Co., Lindberg-Fisher Div. 141
Lindberg-Fisher A Div. of Lindberg Engineering Co. 141
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp. 44
Link-Belt Co. 41
Logan Co. 143
Logan Engineering Co. 290

Mc

McDougall-Butler Co., Inc. 299

M

Macklin Co. 240
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc. 296
Manhattan Rubber Div. 64
Marshall, L. H., Co. 207
Master Pneumatic Tool Co., Inc., The 300
Mathieson Chemical Corp. ..... Inside Front Cover
Metal Blast, Inc. 189
Metallizing Company of America 304
Michigan Oven Co. 212
Milwaukee Chaplet & Manufacturing Co. 82
Modern Equipment Co. 316
Molybdenum Corporation of America 253
Monk Tool Co., The 297
Moulders' Friend, The 244
Muller Machinery Co., Inc. 303
Murphy, Jas. A., & Co. 291

N

National Carbon Co. A Div. of Union Carbide & Carbon Corp. 119
National Engineering Co. 26, 27
National Forge & Ordnance Co. 301
National Lead Co., Baroid Sales Div. 274
National Metal Abrasive Co. 30
National Pigment Co. 202, 203
Neff & Fry Co., The 295
New England Coke Co. 218
New Haven Vibrator Co. 254
New York Belting & Packing Co. 233
Newaygo Engineering Co. 131
Nicholls, Wm. H., Co., Inc. 262, 263
Norton Co. 50, 51, 70, 71, 81

O

Ohio Electric Manufacturing Co., The 301
Ohio Ferro-Alloys Corp. 13
Oliver Machinery Co. 304
Orefraction, Inc. 205
Osborn Manufacturing Co., The 166, 167, 192
Ottawa Silica Co. 280

P

Pangborn Corp. 6, 7
Pekay Machine & Engineering Co. 204
Penn Iron Works, Inc. 261
Pennsylvania Glass Sand Corp. 25
Penola Oil Co. 222
Peters-Dalton, Inc. 170
Petersen Oven Co., The, Stroman Furnace & Engineering Co. Div. 59
Pettibone Mulliken Corp., Beardsley & Piper Div. 149, 150, 183, 184, 185, 186
Philadelphia Coke Co. 294
Pickands Mather & Co. 66
Picker X-Ray Corp. 211
Pittsburgh Crushed Steel Co. 216
Pittsburgh Lectromelt Furnace Corp. 38
Pittsburgh Metals Purifying Co. 173
Plaster Process Castings Co. 247
Posey Iron Works, Inc. 258
Producers Core Sand Corp. 297
Puro-Seal Co., The 304

R

Radium Chemical Co., Inc. 212
Raybestos-Manhattan, Inc. 64
Ready-Power Co., The 265
Reda Pump Co. 300
Redford Iron & Equipment Co. 273
Reed Roller Bit Co., Cleco Div. 169
Remmey, Richard C., Son Co. 281
Republic Coal & Coke Co. 298
Research Corp. 45
Richards-Wilcox Manufacturing Co. 279
Rietz Lumber Co. 247
Robeson Process Co. 303
Roots-Connersville Blower Corp. 226
Ross Operating Valve Co. 250
Royer Foundry & Machine Co. 117
Royersford Foundry & Machine Co. 298

Continued on Page 314

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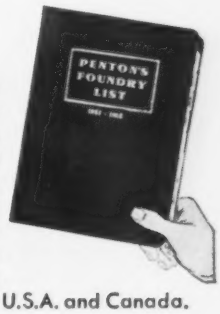

A geographical listing of all foundries giving names, addresses, metals melted, melting equipment used, and departments operated. It lists every one of the more than 5,000 foundries in the U.S.A. and Canada. Cost, $75.00.

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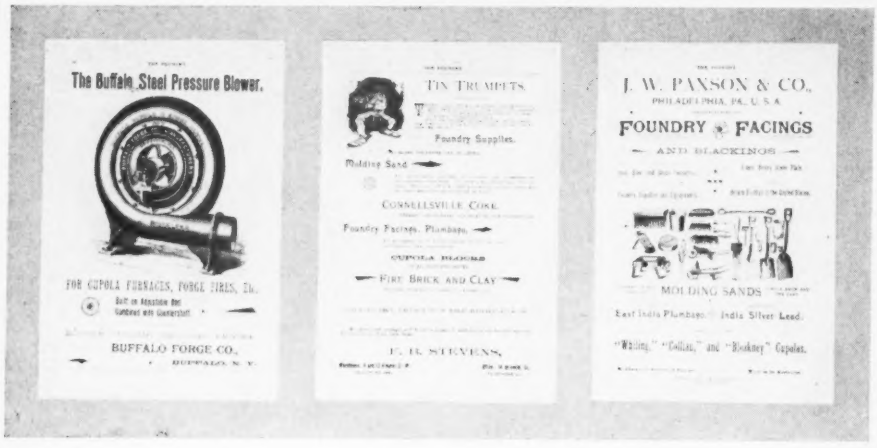


Dear Reader:

There's something nice about birthdays.

Say what we will about not counting 'em after a while or wishing we could add a few when we're very, very young and wanting to be a little older—a birthday is an accomplishment.

As you are aware, having seen our front cover, FOUNDRY has lived sixty years of problems and opportunity with this September issue. A few of the advertisements which appeared in the first issue are reproduced on this page—we have all come a long way.

A third generation of editors and business staff now serves you as the publishers of FOUNDRY. Our plans for the future are spelled out in words which add up to saying, "you can't stand still . . . keep on looking for ways to serve the industry better . . . remembering that service begins with attention to the *one* person who now reads this column."

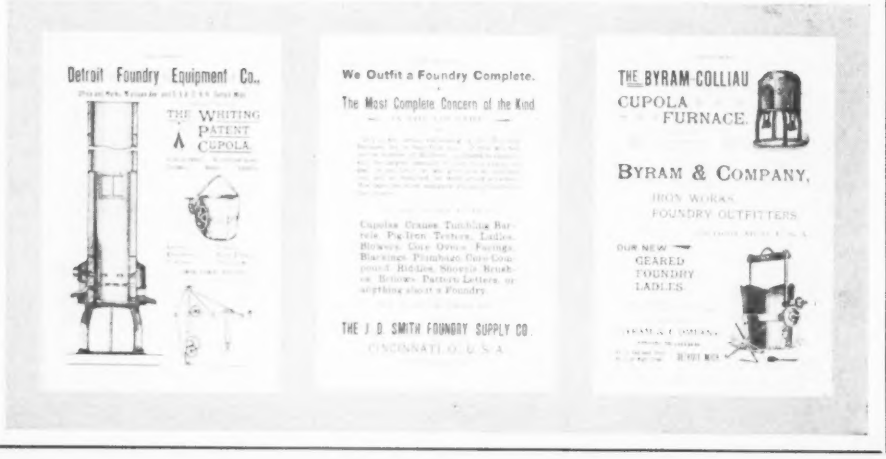
Happy birthday to YOU, too, and please tell us how we can serve you better.

Cordially yours,

F. A. Bolz

Business Manager
FOUNDRY

August 28, 1952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S

Schneible, Claude B., Co. 32
Schrader's, A., Son Div. of Scovill Manufacturing Co. Inc. 181
Scientific Cast Products Corp., The 254
Scovill Manufacturing Co., Inc., A. Schrader's Son Div. 181
Semet-Solvay Div., Allied Chemical & Dye Corp. 284
Shellmold & Machine Co., Inc. 288
Simonds Abrasive Co. 12
Simplicity Engineering Co. 215
Sly, W. W., Manufacturing Co., The 196
Smillie, C. M., & Co. 302
Smith, Eugene W. 201
Smith, Werner G., Inc. 192
Smith & Richardson Mfg. Co. 292
Smith Oil & Refining Co. 164
Smooth-On Manufacturing Co. 305
SPO, Inc. 123
Steel Shot & Grit Co. 216
Sterling Wheelbarrow Co. 84
Stevens, Frederic B., Inc. ... Inside Back Cover
Stroman Furnace & Engineering Co. Div. of The Petersen Oven Co. 59
Stulz-Sickles Co. 292
Sutter Products Co. 229
Syntron Co. 156, 278

T

Tabor Manufacturing Co., The 56, 57
Tamms Industries, Inc. 245
Taylor, S. G., Chain Co. 291
Toledo Matchplate Co. 247
Toledo Scale Co. 247
Tousey Varnish Co. 246
Towmotor Corp. 289

U

Union Carbide & Carbon Corp., Bakelite Co. 15
Union Carbide & Carbon Corp., Electro Metallurgical Co. 78
Union Carbide & Carbon Corp., Linde Air Products Co. 44
Union Carbide & Carbon Corp., National Carbon Co. 119
United States Graphite Co., The, Div. of The Wickes Corp. 147
United States Rubber Co. 161, 234
United States Safety Service Co. 290
United States Steel Co., American Bridge Div. 295
United States Steel Corp., Subsidiaries 295
Universal Engineering Co. 8

V

Vanadium Corporation of America ... 191

W

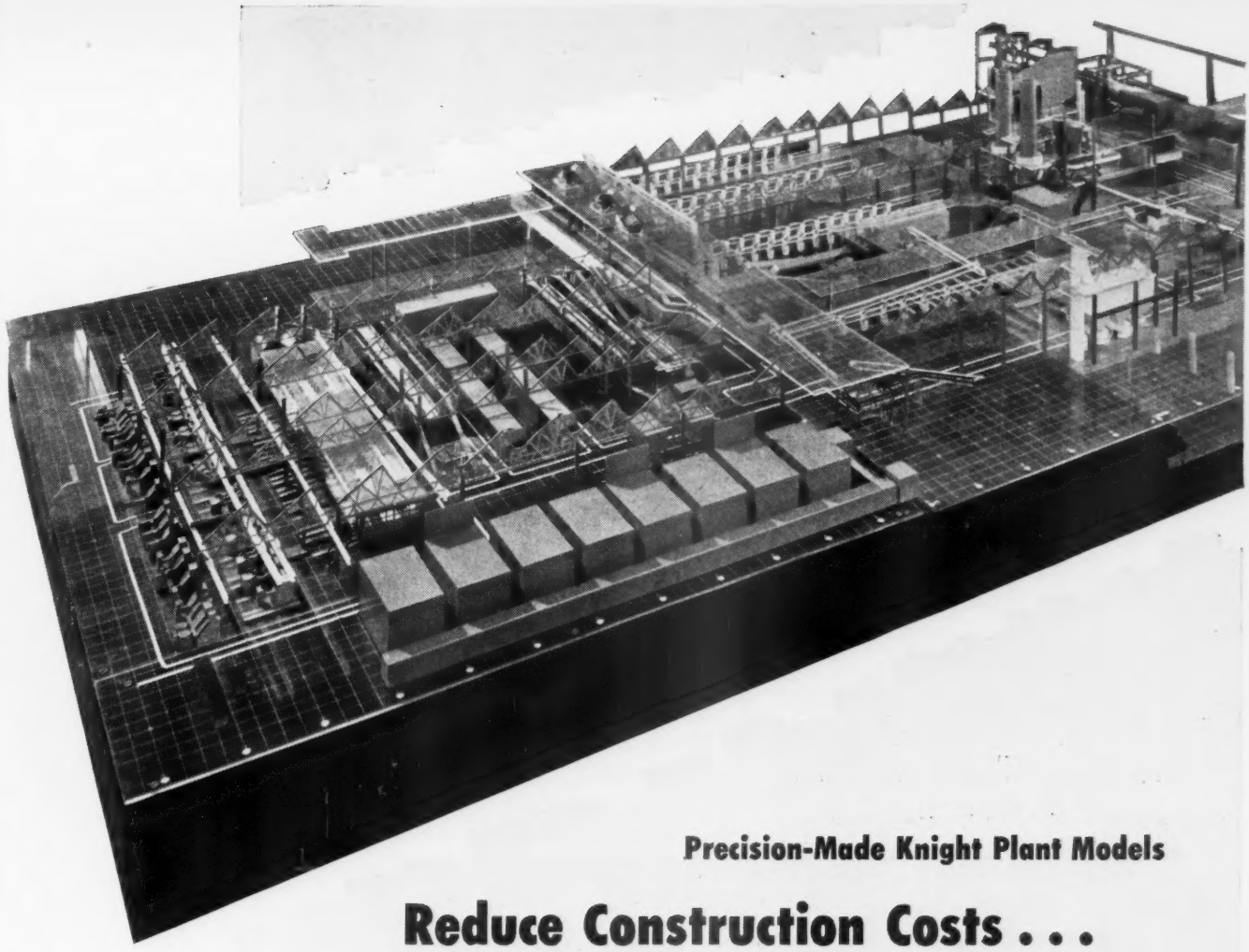
Wellman Bronze & Aluminum Co., The .. 232
Wellman Engineering Co., The 298
Western Hardware & Specialty Mfg. Co. . 292
Westover Engineers 285
Whiting Corp. 137
Wickes Corp., The, The United States Graphite Co., Div. 147
Wickland, A. A., & Co. 299
Will, Arthur E. 299
Willson Products, Inc. 187
Woodward Iron Co. 121
World Bestos 190

Y

Yuba Mfg. Co. 217

Table of Contents, Page 3

Classified Advertisers, 306, 307, 308, 309, 310, 311



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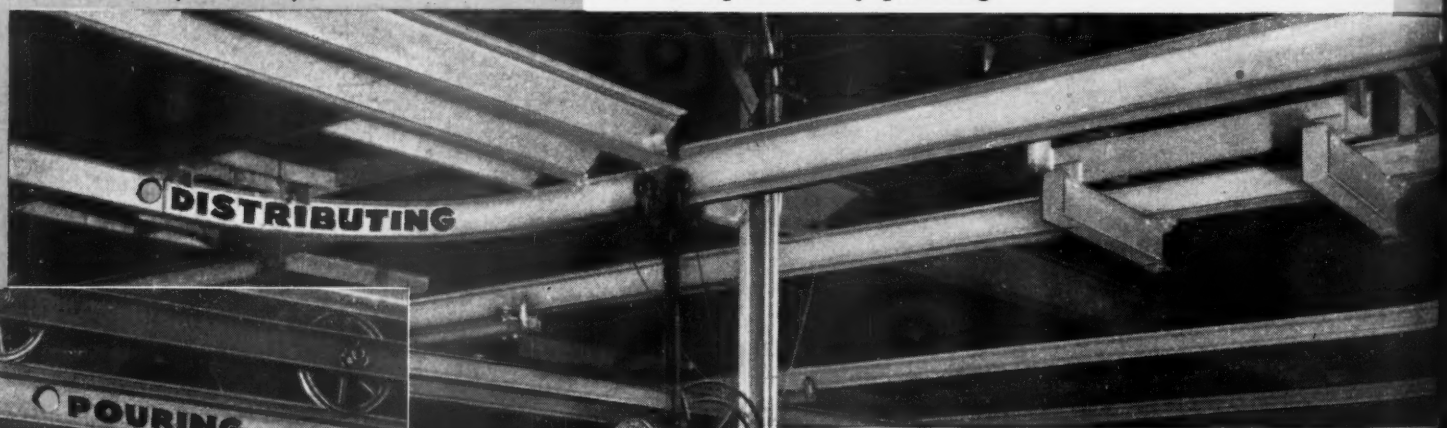
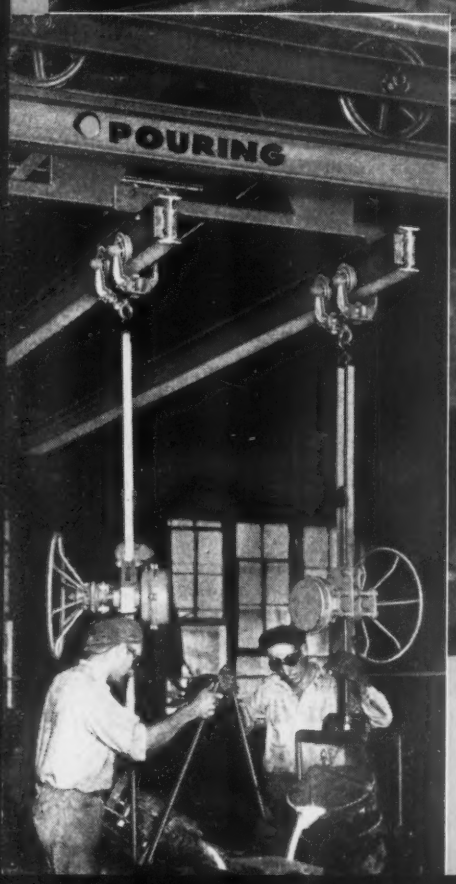
Further completing the effectiveness of MODERN, over-head, hot-metal handling systems are dependable crane locks to link-in the distributing monorail with pouring cranes.

Shown here are three of these over-head crane and monorail combinations. Many more are covered in catalog 150. You can use the coupon. Or, if you have an immediate, over-head, handling problem plan now to write it up for the attention of a MODERN, layout engineer. There's no charge for this preliminary planning . . .

Curved, monorail loops — with turntables, transfer and tongue switches — can be designed to serve the most congested areas at cupolas.

Long spans of distributing monorail; like that shown below, have served well for a quarter century.





Two-up pouring from model "F" Pouring Devices and covered ladles of 300 lbs. capacity. The MODERN crane is an adjustable, double-beam type to serve a wide range of sprue-hole centers.

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This thin, transparent liquid can be sprayed, swabbed or brushed on patterns or matchplates to form a tough surface film that guarantees clean parting and smooth molds.

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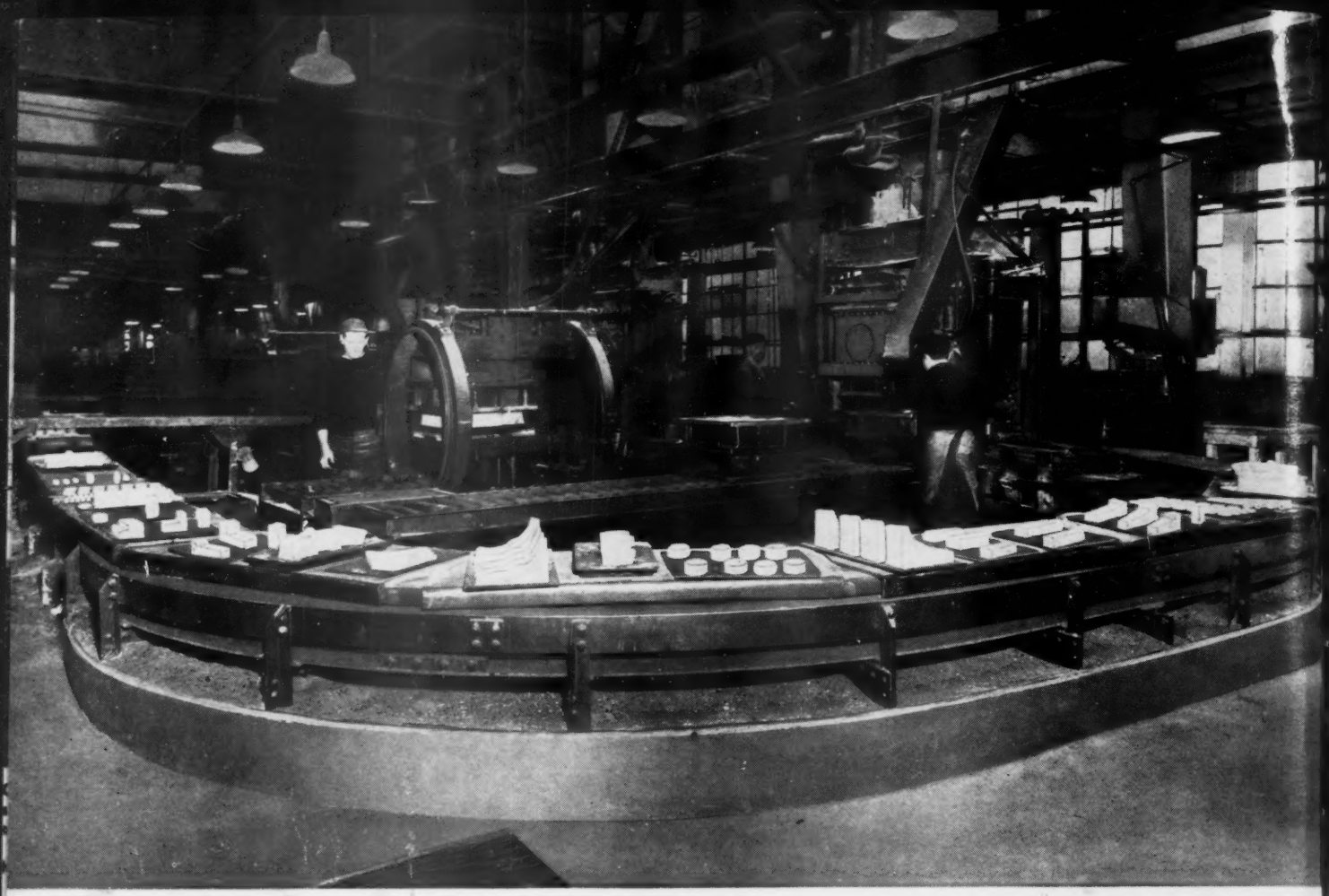
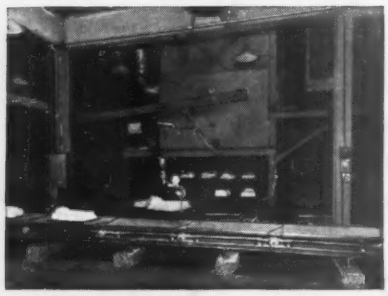


car type *Core Conveyor*

increases core room efficiency



Continuous Car Type Conveyor Showing Transfer of Cores to Core Oven.

Sliding Belt Conveyor Handling Cores From Core Makers to Ovens.

● These run-around continuous car type core conveyors synchronize and co-ordinate core making operations. They bring orderliness and controlled production to the core making department. They avoid the interruptions and interference of racks being brought in and taken out; the traffic of lift trucks; and other confusion. The conveyor passes along the core makers benches at proper height, so trays of cores can be loaded easily — carries the cores without jerking or bumping to the ovens — where they are removed. Core breakage is practically eliminated. Let us work with you in increasing your core room efficiency.

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